

MEDICAL LIBRARY

SEP 9 1946

VOLUME LVI

AUGUST, 1946

NUMBER 8

# THE LARYNGOSCOPE

FOUNDED IN 1896

BY

MAX A. GOLDSTEIN, M. D.

PUBLISHED BY

THE LARYNGOSCOPE

640 SOUTH KINGSHIGHWAY

ST. LOUIS (10), MO., U. S. A.

## NOTICE TO CONTRIBUTORS

THE LARYNGOSCOPE reserves the right of exclusive publication of all articles submitted. This does not preclude their publication in Transactions of the various Societies.

Manuscripts should be typewritten, double spaced, on one side of paper only and with sufficient margins to allow for corrections.

References should be complete: author's surname, initials, title of article, journal, volume, page, month, year.

Six illustrations will be furnished for each article without cost to author. Authors will please limit illustrations to six or assume the expense of additional illustrations.

Proofs will be submitted to authors for corrections. If these are not returned, articles will be published as corrected in this office.

Reprints will be furnished at the following prices:

### WITHOUT COVER

	250 Copies	500 Copies	1000 Copies	2000 Copies
Four Pages	\$ 7.25	\$ 8.75	\$11.75	\$17.50
Eight Pages	15.00	19.00	25.50	38.00
Twelve Pages	22.50	28.50	40.50	64.50
Sixteen Pages	29.00	35.50	47.50	70.00
Twenty Pages	35.00	43.00	59.00	88.00
Twenty-four Pages	42.50	51.50	69.50	104.50
Thirty-two Pages	55.00	66.00	88.00	129.00

### WITH COVER

Four Pages	\$13.25	\$17.00	\$24.50	\$33.00
Eight Pages	21.00	27.25	38.25	59.50
Twelve Pages	28.50	36.75	53.25	86.00
Sixteen Pages	35.00	43.75	60.25	97.50
Twenty Pages	41.00	51.25	71.75	109.50
Twenty-four Pages	48.50	59.75	82.25	126.00
Thirty-two Pages	61.00	74.25	110.75	150.50

Express charges to be paid by consignee.







# THE LARYNGOSCOPE.

---

VOL. LVI

AUGUST, 1946.

No. 8

---

## RHINOLOGY IN CHILDREN, RESUME OF AND COMMENTS ON THE LITERATURE FOR 1945.

D. E. S. WISHART, M.D.,  
Toronto, Canada.

In this resumé of the literature pertaining to rhinology in children the usual journals have been covered. The articles have been roughly classified under the headings previously used and follow the usual order.

### GENERAL ARTICLES ON RHINOLOGY AND ACCESSORY SINUS DISEASE.

A critical analysis of modern therapeutic measures in the management of chronic sinus disease is given by Van Alyea<sup>1</sup> and although it contains no report regarding children, his comments do have a bearing on the treatment of children's nasal disorders, for it is the latter, if untreated, which give rise to the unsatisfactory chronic sinus disease of the adult. Successful therapeutic measures are those which spring from a sound knowledge of the anatomy, the physiology and the histopathology of the structures treated. This was not realized by the earlier rhinologists who sacrificed functioning tissues indiscriminately in their misguided efforts to attain clinical results.

The methods adopted without a proper scientific foundation were largely unsuccessful and it is only within recent years that the reason for the previous failures has been ascertained.

---

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, July 30, 1946.

All measures advocated now for treatment of nasal and sinus conditions must undergo careful scrutiny in the light of our better understanding of the function of nasal and sinus tissues. Considerable attention is now directed towards an improvement in our methods of treating chronic sinus disease. The mucosa which lines the sinus cavity is now regarded as a membrane of defense with capabilities of carrying on indefinitely and of returning to a normal state under favorable conditions. The essentials for repair are provided by the institution of adequate sinus drainage and this is accomplished by the removal of drainage barriers from the neighborhood of the sinus ostium. These barriers may be anatomic or pathologic and are often corrected by simple measures. In the event of failure to unblock the sinus outlet, a new outlet is often indicated. This should be accomplished without disturbing the functioning tissue. Seldom is the radical removal of the sinus mucosa indicated, and it should be instituted only with the understanding that such a procedure offers no assurance of complete and permanent termination of the disease.

Kline<sup>2</sup> states that the nasopharynx should not be neglected in routine examinations of the nose and throat and describes methods by which it can be adequately examined. Many important pathologic conditions may be encountered in the nasopharynx. His purpose in writing is to arouse further interest in the nasopharynx by presenting approved methods of examination and by stressing the importance of the pathologic conditions that may be present.

The nasopharyngeal space located posterior to the nasal choanae and the soft palate is not visible to the casual examiner, but it can be thoroughly inspected either through the nose or through the mouth with special instruments if the difficulties of introducing these instruments are overcome and skill is attained in recognizing the varying pictures presented by the different methods of examination. Anatomically, the normal nasopharynx presents considerable variation as it is viewed with reflected light, with the postnasal mirror and through the lens of the nasopharyngoscope; therefore, fre-

quent use of these methods is necessary to achieve ability in the recognition and evaluation of any pathologic change that may be present.

His plan is first to inspect through the anterior part of each naris with reflected light, then to use the Holmes nasopharyngoscope, and finally, if this examination is not satisfactory or if there are symptoms and signs of nasopharyngeal disease, to elevate the soft palate and retract it sufficiently to visualize the nasopharyngeal area adequately for direct inspection or for inspection with the postnasal mirror.

The nasal mucosa is thoroughly shrunk and moderately anesthetized. He recommends using a nasopharyngoscope with a cord attachment rather than a clumsy battery handle, because with the former there is practically no discomfort to the procedure. The patient is instructed to close the mouth and breathe regularly through the nose. This will relax the soft palate to permit a rapid and thorough inspection of the nasopharynx. This method is especially valuable in tracing streams of pus to their source, detecting small, new growths and inspecting the areas about the Eustachian tubes.

Satisfactory examination behind the soft palate by direct inspection or with the postnasal mirror is seldom easy and many times is extremely difficult. When the soft palate is suspended far forward in a comparatively insensitive throat, no problem is presented, but when the patient is uncooperative and in addition possesses a sensitive, gagging throat with the soft palate in contact with the posterior pharyngeal wall, the procedure requires patience and perseverance even after the area has been anesthetized.

In some cases it is necessary to inject procaine hydrochloride into the motor innervation of the levator veli palatini muscles before the palate can be retracted sufficiently to expose the nasopharynx.

Rosenberger<sup>2</sup> states that in recent years otologists have increasingly accepted Wittmaack's theory regarding the cause of persistently infantile atypical pneumatized mastoids, and that some authors either definitely affirm or imply that an

analogous relationship exists with the paranasal sinuses. The latter would have us believe that the smaller of two frontals or of two antrums in the same individual is of lesser size because of the retarding effect of some infection in infancy, either single and severe, or mild but often repeated. He presents evidence that Wittmaack's theory of altered pneumatization is not applicable to the paranasal sinuses as it is to the mastoid; and yet that it is possible that in isolated instances infection may be a factor in retarding sinus growth. That it operates as a law, he seriously doubts.

Variations in the size of the frontal sinuses in one individual are quite common, whereas similar extreme asymmetry in the size of the antrum is uncommon. If it were true that sinus growth was uniformly retarded by sinus infection in infancy and childhood, as is the mastoid, then it would be most remarkable that it should be the frontal and not the maxillary sinus that exhibits this marked asymmetry of development. Although at birth the frontal sinus is still anteriorly ethmoidal in location, not invading the vertical portion of the frontal bone until the first or second year, and in spite of the slit-like form of the antrum at birth, nevertheless it is fairly stated that the frontal increasingly has the advantage of descendent drainage, while the antrum is handicapped by unfavorable drainage. This being the case and considering the multiplicity of childhood colds, it is probable that many sinus infections, recognized and unrecognized, occur and particularly affect the antrum because of its unfavorable drainage. We anticipate more antrum than frontal infections and on the basis of the Wittmaack theory would expect to see greater asymmetry of the antrum than of the frontal; however, the clinical facts show the frontals are more often asymmetrical, while the antrums are more frequently infected.

The factor of positive atmospheric air pressure is doubtful as necessary for pneumatization, because the antrum and ethmoid cells are present at birth before the establishment of the respiratory function and the resulting positive air pressure in the middle air and nasal passages.

Rhinologic literature contains important articles bearing on this whole subject. Shaeffer states that there may be considerable asymmetry of the antrum on the two sides of the same individual and for our purposes this is the important comparison rather than the variation in sinus size between individuals; however, Shea, with whom the writer agrees, states that of all the sinuses, the antrum is the most constant in development.

He refers to a study which is especially pertinent to the question of the effect of sinus infection on sinus growth presented by Maresh, and Maresh and Washburn from studies made of 3,501 sinus Roentgenograms made on 100 normal children at approximately three-month intervals from birth to maturity. Certain of the conclusions presented were: the speed of the growth process of the frontal was very irregular compared to the antrum; there were occasional differences in the size of the antrum in some individuals but the differences were slight; in two children with asymmetric antrums it was the larger antrum that showed the pathologic changes; if infection inhibited the growth of the antrum, one would expect to find the largest antrum in those children with the least evidence of infection, but such was not the fact; it was concluded that there was no definite correlation between the size of a sinus and the amount or frequency of infection in that sinus as seen in the Roentgenogram. It was further concluded that the size and pattern of growth of the sinuses is as much an inherent individual characteristic as the size of the nose or the color of the eyes.

Because of particular interest in this subject, the writer decided to investigate a series of 163 private patients who had evidence of suspected sinus infection. He made the following observations: 1. Of the 163 patients, only 53 per cent had asymmetrical frontals, while 87 per cent had symmetrical antrums. 2. Of the 163 patients, 10 per cent had infected frontals, whereas 74 per cent revealed evidence of antrum infection. 3. Of the 163 patients, 9 per cent had aplasia of one or both frontals, while there was no instance of an absent antrum.

Two points were worthy of notice in this private series and summary: one was the greater variability in size of the frontal sinuses in the same individual as contrasted with the greater uniformity of size of the antrum; the other point, and an important one, was the much greater frequency of infection in the more asymmetrical antrum as compared with the low incidence of infection in the more variable frontal; were infection a common cause of all this sinus pneumatization, it would be reasonable to expect the greater asymmetry in the sinus, which is more often the seat of infection.

After giving five pertinent case reports, of which four were upon children, he concluded that as a general rule sinus aplasia is not a sequel of sinus infection, though such a relationship may occasionally occur, hence the Wittmaack theory of altered mastoid pneumatization may not appropriately be applied to explain altered sinus pneumatization.

Hovanic<sup>4</sup> states that the problem of the portals of entry of the virus of human poliomyelitis has long been an enigma to medical science. The answer to this problem is of primary importance not only because it will add greatly to the sum total of knowledge of the disease, but also because it would, in all probability, provide a clue, or perhaps the answer, to the mode of transmission of poliomyelitis virus, and, equally important, it would give investigators a clue to the possible methods of host protection and immunity. Since the turn of the century, many investigators and organizations have devoted time and effort to discover the natural route of infection of this disease. The knowledge thus gained has been gathered from the results of experimentally produced poliomyelitis in laboratory animals, from histopathological evidence and virus assays from fatal human cases, and also from critical and guarded application and correlation of experimental findings to the clinical and pathological picture of human poliomyelitis.

The result of this extensive and intensive research combined with simple logic based on the anatomy of the human body has suggested three possible avenues of which any one or a combination of several may act as the portal of entry of



the virus in humans. These possibilities are: 1. the olfactory portal of entry, 2. the gastrointestinal portal of entry, and 3. the cutaneous portal of entry.

For years many investigators in Europe and in this country championed the olfactory pathway as the portal of entry of human poliomyelitis. He carefully reviews many histopathologic studies from different parts of the world which agree in pointing to the conspicuous absence of poliomyelitic lesions in the olfactory bulbs of humans struck by the disease. One might question whether the absence of typical lesions in the olfactory bulbs indicated the absence of virus in the bulbs and, therefore, ruled out the olfactory pathway as the portal of entry in man, although it is noteworthy that practically all the sites in which lesions have been found in monkey poliomyelitis have also been found to be involved in man. He reviews, also, much experimental and clinical evidence, all of which agree in concluding that the olfactory pathway is not the portal of entry of poliomyelitis virus in man. In contrast to this, because experimental, clinical, anatomic and pathological evidence points to the gastrointestinal tract as the portal of entry of the virus of human poliomyelitis, it seems that this portal should be accepted as the natural and main portal until proven otherwise. With the gastrointestinal portal the types and symptoms of human poliomyelitis are logically explained.

He is careful to point out, however, that the possibility of a cutaneous portal of entry must not be entirely forgotten or ignored. It should be remembered that poliomyelitis has been accidentally produced in man when intradermal injections of vaccines were being tried in this disease.

Torrey and Reese<sup>5</sup> made cultures of material from the throats and noses of 105 full-term infants during the first 24 hours after birth. No bacterial growth was obtained from swabbings of those regions taken within four hours after birth of 95 per cent of the group so studied. This result confirms the conclusion of a previous study that normally the initial flora of the nose and throat is acquired mainly from the environment after birth and not from the parturient

canal. Cultures of material from infants 13 to 18 hours old indicated continued sterility of nose in 31 per cent and of the throat in 4 per cent, but by the end of the first day the cultures of all infants examined yielded growths from both regions. Staphylococci, alpha or gamma streptococci and less frequently diphtheroids were the first organisms to invade the oral cavity. The upper respiratory tract during the first two weeks of life rarely becomes infected with the pneumococcus, the beta hemolytic streptococcus, hemophilus influenzae and the Friedlander bacillus through contact with nursing mothers who are carriers of these organisms. Although occasionally the pneumococcus was cultured from the nasopharynx within a few days of birth, it soon disappeared from the secretion. The mucous membrane of this region of the new-born is unreceptive not only to these pathogens but to certain other bacterial types such as streptococcus salivarius, the Gram negative diplococci and the hemoglobinophilic hemophilus hemolyticus which thrives there later in life. If acquired, these organisms are also soon eliminated. Routine use of the conventional types of face masks by persons in contact with the infants is of little value in preventing the acquisition by the new-born infant of organisms of the respiratory tract, pathogenic or otherwise.

Irwin and Frankel<sup>6</sup> reported the results of a study of 100 school children suffering from frequent colds. From these investigations they concluded that the child with frequent colds is of normal development, build and intelligence, and does not suffer from any other organic disease; the treatment of this condition is entirely a problem for the ear, nose and throat surgeon, who should keep these children in a special clinic where they can receive conservative and operative treatment. A general medical or surgical, pediatric or allergic clinic should not have to deal with these children as apart from the local conditions affecting the nasal passages, sinuses and throat, no other abnormality could be discovered.

This paper proved of great interest to general practitioners and aroused criticism of various sorts. Mallinson<sup>7</sup> stated that the above article overlooks the possibility of the cause of



frequent colds being some older member of the family with chronically infected throat or nose. Milner<sup>8</sup> calls the article a good example of modern medicine gone wrong and stresses the neglect of evidence regarding breathing properly through the nose. Smith<sup>9</sup> notices the omission of hereditary factors, and Gray<sup>10</sup> described the evidence as utterly inadequate and pleads for the proper investigation of these children as individual human beings, while Greig<sup>11</sup> concludes that although the work was conscientiously and painstakingly carried out, such positive conclusions based on such a limited and regional survey cannot be anything but misleading.

#### COMPLICATIONS OF ACCESSORY SINUS DISEASE.

Abscess of the nasal septum caused by trauma is not uncommon. Beck<sup>12</sup> calls attention to the rarer abscess of the septum caused by suppurative inflammation extending from the lateral cellular mass of the ethmoid bone. In his paper he incorporates the case report of two patients with abscess of the nasal septum following acute sinusitis. One of these was in a white girl, age 10. He states that abscess following sinusitis probably is not preceded by the formation of hematomas. There was no hematoma in either of his cases. He finds that little has been written on abscess of the septum following sinusitis and thinks it quite possible that sinusitis, especially ethmoiditis, has been frequently overlooked in the history and in the examination of the patient with this disease.

Diabetic gangrene of the nose is rare enough to be reported as a medical curiosity. Dysart<sup>13</sup> states that a search of the literature showed only 15 cases of diabetes involving the head. He gives case reports of three patients. He states that Bow-ers, in 1924, reported a remarkable series of three cases in which the patients were all children under 11 years of age. The first two patients were seen before insulin was discovered and both died. The third recovered with insulin. The first patient was aged four-and-one-half. There was gangrene of the septum and of both left turbinates, also a loss of tissue of the left side of the roof of the mouth. The second patient was 10 years old and had gangrene of the left lower eyelid and

cheek. The third patient was also aged 10 and she had almost complete loss of the septum and much swelling of the eyelids, but with insulin she recovered.

Purulent meningitis following inflammation of the accessory cavities of the nose is a rare complication and practically always it has a fatal issue. Ebert<sup>14</sup> gives the case history of two patients who recovered. One of these was a school boy of 16. The two cases were almost completely identical with respect to the clinical picture as well as the course of the disease. After a short and slight prodromal stage, extremely serious symptoms of meningitis appeared, which soon broke down the patients both physically and psychically. These symptoms were such that a fatal outcome could be taken for granted. In both cases the clinical picture changed radically after the focus had been discovered in the accessory cavities and drained. After two to three weeks' treatment, both patients recovered.

He admits that it might be thought that the recovery was due to chance, but in his opinion such an attitude is wrong. He thinks that probably the actual state of things is that there is a form of meningitis caused by the common pus bacteria which is secondary to an inflammatory process in the accessory sinuses of the nose and which begins with slight nasal symptoms but is soon forgotten or ignored by the patient and later is overlooked by the doctor.

Bacteria<sup>15</sup> may invade the cavernous sinus by six different routes — the six anatomical venous communications — and the result may be an acute thrombophlebitis or a slow obliteration of the sinus. Invasion along any route may give rise to either clinical type of infection, but the most common combinations are acute infection from anterior veins, and slow obliteration from posterior veins. Eagleton's monograph, which contains examples of all the possibilities, is almost terrifying in its disclosure of dreadful results from the most trivial wounds and infections of the face, but fortunately the vast majority of cases of aural and nasal suppuration avoid the catastrophes he describes. The symptoms and physical signs in acute fulminating cavernous sinus thrombosis are

striking enough to impress the most casual clinician, and treatment should never await their full display. The nasal source of infection is a septic lesion of the face with spread along the veins entering the sinus anteriorly. Erythema of the eyelids and dilatation of the superficial veins appear early, and are followed by proptosis, chemosis and papilloedema. These signs are due partly to the venous obstruction and partly to lymphatic engorgement and blockage; sometimes also to pus in the orbit. In addition there are the manifestations of general blood stream infections; swinging temperature, rigors or chills, sweating and formation of metastatic abscesses. The chronic cases arise chiefly from aural sup-puration with retrograde thrombosis from the lateral or sigmoid sinuses along one of the petrosals. This is usually a process sufficiently slow for a collateral circulation to form. Consequently the classical signs of venous obstruction are absent or transient, although subsequent phlebitis of the sinus wall of the ophthalmic veins may cause chemosis and exophthalmos. The diagnosis is difficult and cases may pass unrecognized. Rarer forms of thrombosis follow spread along the pterygoid venous plexus or from the sphenoidal or other nasal accessory sinuses, or from direct contact with acute suppurating petrositis, and each may give rise to the acute or chronic syndrome.

Whatever its underlying cause, venous thrombosis must be regarded as a protective mechanism following on phlebitis. The thrombus may be aseptic — that is, the body defense may have overcome and destroyed the infecting organisms before while the clot is forming — or septic, when this attempt has been unsuccessful. It is in this way that to the local effects of venous occlusion may be added those general to toxemia together with septicemia or pyemia. Treatment must be directed against the general effects of the infection and may also be needed to relieve the local effects of venous obstruction, since these can be disastrously incapacitating; but it is essential to remember that the thrombosis is a part of the natural mechanism of repair tending to a spontaneous cure. These principles have long been appreciated and attempts have been made to apply them in cavernous sinus thrombosis

by direct surgical attack on the sinus itself and its tributaries, and by more conservative methods such as serotherapy, blood transfusions and chemotherapy.

In reviewing the cases successfully treated up to 1936, Cavenagh found that out of a total of something less than 50 cases (the number is uncertain owing to overlapping references and doubtful diagnosis), probably not more than seven were of the acute infective type. Treatment by radical operation was adopted in three of them. Of the remainder, only two had been treated by operation on the sinus itself; the others cleared up with surgical eradication of the primary source of infection and of any localized areas of suppuration. Conservatism is a good rule in treating acute pyogenic infection of the sinus, operation being reserved for cases where pus has formed or there is necrosis of bone. Other methods of meeting the original onslaught of the infecting organism are essential, preferably those acting in harmony with the normal body process. Eagleton prophetically wrote: "The nature of the pathological anatomy of thrombophlebitis would appear to be favorable for treatment by sterilization of the blood stream by . . . bactericides . . . In the near future there will be discovered specific chemical compounds which will influence the different pyogenic infections of the blood stream . . . and will be specific for (each type)." The sulfonamides and penicillin have fulfilled the greater part of this prediction. The sulfonamides are now part of the routine treatment of the early stages of an acute pyogenic infection of any severity, and their success in sterilizing the blood stream and the forming thrombus in the cavernous sinus has been recorded by Seydell, Morrison and Schindler, Wolfe and Wolfe, and others. Since many of these sinus infections arise from superficial staphylococcal lesions, it was to be expected that even greater success would be achieved with penicillin, and the hope looked like it might be fulfilled when, in their first series of infections treated with penicillin, Florey and his colleagues restored a boy with cavernous sinus thrombosis from a moribund state to convalescence. This boy later died of a ruptured mycotic aneurysm, but subsequent cases have been more fortunate. Thus, Johnstone reported in

these columns on Jan. 6 a case in which complete recovery was attained, although penicillin treatment was unavoidably delayed for 10 days. Full doses of a sulfonamide and penicillin would seem the most promising combination, since some strains of streptococci and staphylococci as well as *B. proteus* and *Ps. pyocanea* are resistant to one or other of these drugs. Chemotherapy is likely to cure just that type of case where the outcome was formerly almost hopeless — spread of infection from anterior veins draining a septic lesion of the face — because a lesion here is plainly visible and any divergence from routine healing, or signs of more deep-seated mischief, become rapidly obvious, so treatment can be begun in time. The osteoplastic flap of Kroenlein, evisceration of the orbit, and other dramatic operative procedures are likely to be relegated to history except for cases where thrombosis and infection reach the sinus from more obscure lesions, and even here chemotherapy may succeed in sterilizing the clot before it liquefies to pus.

It has been suggested that thrombus formation can be prevented by the administration of the anticoagulants, heparin and dicoumarol. In addition to three recoveries with heparin, recorded by Lyons and Schall, another was reported by Muntarbhorn in *The Lancet* of Jan. 6. In all these cases full doses of a sulfa drug were also given. Lockwood, White and Murphy, too, employed heparin and dicoumarol as an adjunct to penicillin in a successful case, but with the available evidence of recoveries with chemotherapy alone, and in the absence of controls, the addition of anticoagulants cannot yet claim to have established its practical value. They may have a part to play in the cases of chronic obliterative thrombosis which arise from the lateral sinus and spread to the cavernous sinus, for if the diagnosis is made very early, heparin or dicoumarol could possibly limit the extension of the clotting process. In other cases it does not seem justifiable to oppose a natural defense mechanism.

White<sup>6</sup> publishes a case report illustrated by two photographs and a chart of a boy 14 months old who appeared almost moribund with thrombosis of the left cavernous

sinus, who made almost no response to sulfathiazole therapy, although the blood concentration of the drug was 6.6 mg. per 100 cc., but who under treatment with penicillin improved within 24 hours, with a negative blood culture and rapid convalescence, so that he was discharged from hospital two weeks after treatments began.

Diagnosis was based on: 1. a temperature fluctuating daily between normal and 104° to 105° Fahrenheit; 2. a blood culture yielding staphylococcus aureus; 3. an acute purulent discharge from the left nostril (the left antrum was the septic source of the infection); a culture of the pus yielding a pure growth of hemolytic staphylococcus aureus; 4. cultures of the pus obtained from the left nostril and of the blood, both yielding the same organism, a pure culture of staphylococcus aureus). (The organisms recovered from the pus in the nostril were more actively hemolytic than those recovered from the blood stream). 5. A proptosed left eye with edema of the lid.

*Comment:* This case report testified to the value of penicillin therapy in severe staphylococcal septicemia from a purulent sinusitis. There is insufficient evidence to show that the cavernous sinus was involved.

Herzig<sup>17</sup> supplies a case report on cavernous sinus thrombosis in a child of 15.

Returning from a hike on the evening of July 20, the patient was thoroughly soaked by a storm and the following morning his left eye was swollen. The swelling rapidly increased and the exophthalmos was so great that the eye fairly bulged to the palpebral fissure. On Aug. 3, temperature was 101.4°, the eye was proptosed forward and downward about three-fourths of an inch. There was complete motoroculi paralysis except for the sympathetic fibres to the iris which reacted to light and accommodation. The fourth and sixth cranial nerves showed a slight action. Enormous edema of the upper lid was present. The left fundus showed a tortuous engorgement of the vein with marked congestion of the disc. Arteries appeared normal. Manual tension normal. Fundus



of the right eye showed tortuous and distended veins, but there was no congestion of the disc. The treatment was sulfonamides, boric acid compresses as well as an ice cap, irrigations of right and left antra which were essentially negative. On April 21, 1945, his vision as well as extraocular muscle movement was absolutely normal. A consultant was not sure as to whether the patient had a definite cavernous sinus thrombosis or whether the condition was secondary to an acute sinusitis.

#### TREATMENT OF ACCESSORY SINUS DISEASE.

Penicillin has become of so much importance in treatment that this resumé would be incomplete did it not contain a reference to an authoritative article on the subject.

Farquharson, Greey and Townsend<sup>18</sup> present such a statement in their summary of the work done by the Joint Services Penicillin Committee.

At the beginning penicillin was given intravenously, but soon the intramuscular route came to be used almost exclusively. It was more comfortable for the patient, administration was easier and treatment as effective when penicillin was given intravenously.

Since penicillin does not pass readily into the spinal fluid or serous or synovial cavities, injections into the thecal, pleural or articular spaces were also employed when necessary to insure an effective local concentration of the drug. Topical applications were used in the treatment of infections of the skin and for a time in extensive soft tissue wounds. Their results demonstrate that penicillin is an effective agent in the treatment of acute infections caused by staphylococci, hemolytic streptococci, pneumococci, gonococci and other microorganisms known to be sensitive to penicillin. The response in acute cases was excellent in those treated intensively in the early stages of their infection. When infection localizes, surgical drainage helps materially in recovery. In some of the acute cases with a fatal termination, treatment was started late or was inadequate according to present standards.

In chronic conditions such as osteomyelitis the effect of

penicillin treatment was much less striking. This is in keeping with the belief that penicillin is most effective when micro-organisms are multiplying rapidly.

Other factors also contributed to the poor response to penicillin obtained in chronic infections and in some of the acute infections. Perhaps the most important of these was the impossibility of bringing penicillin into contact with the micro-organisms, especially those present in dead avascular tissue, *e.g.*, sequestrum, blood clot, bacterial vegetation, carbuncle, dense fibrous tissue. In other instances the possibility that the infecting micro-organism was resistant to penicillin was not excluded. The limited bacteriological investigations which were done in connection with this study demonstrated considerable variation in species and strain sensitivity to penicillin. Some strains of staphylococci were resistant to concentrations of penicillin considerably in excess of those obtained in the blood stream following the usual therapeutic doses. This may have been due to the elaboration of a bacterial enzyme similar to the penicillinase of the colon bacillus.

To achieve good results, penicillin had to be brought in contact with the infecting micro-organism in the tissues and maintained at an adequate concentration for a sufficient period of time. In most instances this was accomplished by an adequate concentration in the blood with the addition of local injections when the infection involved thecal, pleural or articular spaces.

Because of the rapid excretion of penicillin, an effective blood concentration was maintained by continuous administration or by injections given every three hours. When the total daily dose was 100,000 units given by continuous drip, the blood concentration varied between 0.2 and 0.1 units per cc., a level found to be adequate for the great majority of sensitive micro-organisms. If the same daily dose was given by repeated injections every three hours, the blood concentration following each injection reached a peak in 15 to 30 minutes of 0.5 or more units per cc. It then fell quickly, so that after the second hour it was below 0.05 units, while at three hours only



a trace or none was found. Wide fluctuations of the blood concentration are attendant on injections of aqueous penicillin and any procedure that would maintain it at a satisfactory level with less frequent injections would be a valuable advance in the technique of therapy. Despite the possible advantages of a uniform blood concentration of penicillin, no difference was noticed in the clinical results of the cases reviewed which could be attributed to the method of administration.

The article contains a schedule of dosage for various infections in a table as a guide for routine therapy. It should be realized, however, that due to variations in sensitivity of infecting organisms, larger doses may sometimes be required. When facilities permit the determination of the penicillin-sensitivity of the infecting micro-organism, the dose of penicillin administered should be regulated by the laboratory findings. If it is not feasible to identify the infecting micro-organism or measure its sensitivity, the dosage should be doubled or trebled when the patient is not responding to routine therapy. At the same time the diagnosis should be questioned and a search undertaken for complications or associated diseases that might have an unfavorable effect on the patient's progress.

Woodward and Holt,<sup>10</sup> in order to evaluate the local use of penicillin in infections of the ear, nose and throat, began a study of a group of patients in February, 1945, for the purpose of taking advantage of the seasonal peak in the incidence of upper respiratory infections. The study continued for three months. During this period approximately 500 patients were treated. Of this group, the case records were complete enough in 339 to be used for statistical purposes.

They concluded that the local use of penicillin has proved helpful in the control of acute and subacute infections of the nose, sinuses, nasopharynx, pharynx and mouth, and of occasional benefit in certain cases of chronic otitis media. It has also proved beneficial postoperatively in mastoid and sinus surgery.

It has been of no value in acute otitis media and of no or negligible value in chronic sinusitis and chronic sinusitis associated with allergic rhinitis.

Its usefulness in the treatment of the common cold is still undetermined.

In those cases in which it has proved beneficial, its effect will no doubt be enhanced by its combined use systemically or by the combined use of an appropriate sulfonamide.

Local application does not produce any drastic change in the bacterial flora present in the nose and throat. Its effect seems to be more bacteriostatic in nature than bactericidal. In several patients who had recently recovered from scarlet fever they were unable to alter the bacterial flora on repeated cultures, after local treatment.

The solution, 500 units per cc., and the lozenge provide the simplest and most effective means of application. The water-soluble jelly was useful at times for instillation into the nose at bedtime and in the treatment of atrophic rhinitis, in which the nasal symptoms were ameliorated.

Proetz<sup>20</sup> has proven that solutions of penicillin (sodium salt) in the concentrations recommended for topical applications have no damaging effect on the cilia or epithelium of the respiratory mucosa over periods useful in clinical practice. He has also shown that solutions of higher concentrations tend to increase ciliary action in various degrees. The method by which these conclusions were reached is adequately described in a short, clear laboratory note.

So that enthusiasm for a wonderful therapeutic agent should not be carried to unjustifiable lengths, the reporting of failure of treatment should be studied. Priest<sup>21</sup> contributes such a report and concludes that because of his unsatisfactory experience the treatment of long-standing maxillary sinusitis by local irrigations with penicillin has been abandoned, but thinks that it may prove to be useful in subacute infection.

Van Alyea<sup>22</sup> states that sinus therapy is based on our knowledge of nasal physiology and the histopathology of

sinus mucous membrane. The cilia that wave in the direction of the sinus outlet and the sheet of mucus which covers them serve as a primary defense mechanism. A sound defense is found in the stroma of the mucous membrane. Contributing factors to sinus infection are: the impinging middle turbinates; a cellular turbinate; the presence of cells encroaching on the ostia. These factors may impair the drainage of the frontal or anterior ethmoid sinuses. Hyperplastic or polypoid tissue associated with chronic infection or allergy is the principal cause of drainage blockage.

Few drugs may be applied to the nasal ciliated membrane without causing harm. The nose drops should be: 1. non-detrimental to ciliary action; 2. slightly acid with a Ph of 5.5 or 6.5; 3. isotonic; 4. non-injurious to the mucous membrane; 5. devoid of systemic side effects.

Solutions of ephedrine, one-fourth of 1 per cent, in sodium or ephedrine-like solutions, fulfill these requirements. Solutions containing oil or silver protein or silver salts (argyrol and neosilvol) are not acceptable.

The most common causes of nasal blockage are nasal allergy, systemic disorders producing vasodilatation in the turbinates, swelling of the nasal tissues, and suppurating sinuses.

The author summarizes the indications for submucous resection: 1. Deviated septum with nasal blockage when all other possible causes have been eliminated. 2. Pressure from a deformed septum crowding the middle turbinate against the lateral wall, thereby blocking sinus drainage. 3. Pronounced spurs or ridges which impinge on the inferior turbinate.

The membrane lining a sinus is a disease-resisting membrane. The sinus cavity is infected because of inadequate drainage facilities; the infection and the thickening of the mucosa persist for the same reason. With the prompt removal of the exudate, hyperplastic changes will not occur and if threatened will disappear.

The modern trend toward conservative treatment is attributable not only to the failure of the radical operation (such

as frontoethmosphenoidectomy) but also to the improvement in the conservative measures (such as infraction of the middle turbinate, correction of a deviated septum, removal of polypi, proper management of an allergic rhinitis, a few sinus irrigations, window operation in the inferior meatus, displacement therapy for the ethmoid cells).

Tremble and Smith<sup>23</sup> contribute an article on nasal medication in sinusitis which contains a very useful review of the subject. It is difficult to do justice to this article in this resumé and it should be studied in the original.

They have reviewed the changes that have occurred in the past few years in the treatment of upper respiratory infections by nasal medication and described various medicaments that have been used and which have gradually fallen into disfavor or disuse and they give the reasons for these changes in procedures. The trend in recent years has been towards nasal medication which does not disturb the normal physiology of the nose. Rhinologists, to some extent, have been confused by variation in the results of investigation of the determination of intranasal Ph, and they point to a recent attempt by Parkinson to clear up the confusion.

The Ph value depends on a number of factors. Temperature changes influence it. For instance, cold tends to make the secretion alkaline, while heat causes a drift towards acidity. During an acute cold or sinusitis, as well as in the presence of an allergic attack, the Ph readings of nasal secretions are high; that is, alkaline.

Nasal Ph also varies with rest and heat, and throughout the day. Rest in bed and heat tend to produce an acid reaction in nasal Ph and this is more marked at night than during the day. Although it is sometimes difficult to persuade a patient in the early stages of an acute rhinitis or sinusitis to remain in bed, theoretically this appears to be sound advice. Apart from the danger of spreading the infection, rest and heat alone tend to reduce the high alkalinity of the nasal secretion to the normal slightly acid level.

Considering that the vast majority of acute sinus infections, excluding allergy, originate from the common cold, the early treatment of this condition is important. The organisms most frequently found in the nose during an acute coryza or nasopharyngitis are beta hemolytic streptococci, pneumococci and *H. influenza*, although the predominating organism varies from year to year. Fortunately, from a rhinologist's point of view, the secondary invaders which produce sinusitis and ear complications — streptococci, staphylococci and pneumococci — are controlled by chemotherapy.

In view of the miraculous results obtained with the sulfonamides by mouth and intravenously in cases of pneumonia, septicemia, streptococcus infection, etc., it was thought that locally they would be just as effective. A series of cases of acute sinusitis were treated by nasal distillation of 5 per cent sulfathiazole three times a day for a 10-day period. Blood levels were then taken but it seemed impossible to raise the concentration above 0.5 mgm. per cent. They point out that there is a difference of opinion as to how the solution should be applied to the nose, and express the opinion that in acute cases where the turbinates are inflamed and swollen it is doubtful whether solutions from nasal sprays reach the ostia of the sinuses. Unless instructions are given by the surgeon, nose drops applied by patients usually spread over the lower half of the nose and do not enter the middle and superior meatuses where shrinkage is important. In this way certain localized areas are blanched by vasoconstrictors, especially on the inferior turbinates, and if this is repeated over long periods destructive changes occur which lead to permanent damage of the mucous membranes.

After discussing gramicidin they show the value of penicillin and express the opinion that it has a wider range of usefulness against Gram-positive organisms without the disagreeable side effects of the sulfonamides. They had excellent results using penicillin by the Proetz displacement method every 48 hours for four, six, eight or 10 treatments, depending on the offending organism reported by the bacteriologist. They give a long case report regarding a man of 61, who was

improved by this form of therapy and, then seeing they had had such a striking improvement witnessed in that patient. they state that the same method has been successfully applied to children.

In young children the results have been equally good. Sinus infection in which the offending organism was pneumococcus, streptococcus or staphylococcus and which were not complicated with allergic manifestations have responded readily to this form of treatment. A recent case of low-grade sinusitis in a boy of 10 years, caused by neisseria catarrhalis, cleared up after penicillin had been introduced into the sinuses on four occasions by the displacement method. Material on a swab taken from the middle meatus gave a profuse growth of this organism, almost in pure culture. They have been unable in the literature to find any reference to penicillin acting on neisseria catarrhalis, but basing their therapy on the close resemblance of this organism to the gonococcus and the meningococcus, they tried it with gratifying results. Thus there is in penicillin an agent which is non-toxic, is isotonic, is slightly acid with a Ph of 6.5, does not interfere with ciliary streaming and does not injure the nasal mucous membrane. They had no clinical evidence whatever that overdosage with penicillin, either systemically or topically, had ever been observed.

Fortunately for the rhinologist, a great proportion of the infections of the upper respiratory tract involving the sinuses are caused by Gram-positive organisms, and many of these respond to penicillin therapy.

James<sup>24</sup> describes the treatment of nasal sinusitis by local applications of proflavine sulfonamide and penicillin sulfonamide paste and discusses the selection of suitable cases. Puncture lavage and injection of paste at five- to seven-day intervals is recommended for cases of suppurative sinusitis not responding to conservative treatment. The usual conservative treatment is continued throughout.

The antrum and sphenoid are the most suitable sinuses for this treatment. Two series of figures are presented, the first



being those of private and Bristol Children's Hospital cases for 1941 and for four months of 1942, treated with paste, compared with similar cases treated without it in 1939. The cases treated with paste were selected according to principles detailed in part of the paper. In 1939 — 41 per cent of the cases at the Bristol Children's Hospital treated without paste are described as successful. In 1941 to 1942, at the same hospital, 86 per cent of the cases treated with paste are described as successful.

Feinberg and Friedlander,<sup>28</sup> reporting from the Department of Medicine, Division of Allergy, Northwestern University Medical School, state that their first clinical experience with privine hydrochloride intranasally in allergic and infectious rhinitis gave them the impression that it was the most effective vasoconstrictor available. The continued use of this drug in their practices, however, began to give them increasing evidence that in addition to its vasoconstrictor action there was a congestive phase. In the last year or so they have been impressed with the large number of patients in whom symptoms of nasal congestion have been aggravated or prolonged by the continued use of privine.

Privine hydrochloride is marketed in 0.05 per cent and 0.1 per cent solution, the former being recommended "for children or patients with an extremely sensitive nasal mucosa." Chemically it is 2-naphthylmethylimidazoline hydrochloride, a colorless substance readily soluble in water or saline solution. The marketed solution is isotonic and has a Ph of 6.2, approximating that of the normal nasal secretions. The action of privine, as of other sympathomimetic drugs, is by constriction of the peripheral vascular bed through stimulation of the sympathetic nerve endings. Prolonged action, isotonicity and compatibility with ciliary action are features stressed by the manufacturers. Its vasoconstricting effect is produced rapidly and lasts from two to six hours (in the beginning of its use) and is free of any tingling, burning or smarting. The congestive effect from the continued use of privine might be attributable to one or more possible actions of the drug:

1. It could be assumed that this substance has a vasodilator

component in addition to its vasoconstrictor action. 2. The increased vasomotor changes might be due to an allergy to the drug induced by repeated use. 3. The irritability of the tissue could be explained on the basis of chemical irritation or injury if the drug was a primary irritant. 4. The vasodilatation could be due to a simple reaction following an intense and prolonged vasoconstriction.

The authors discuss these possibilities and conclude that vasodilatation as a reaction of intense vasoconstriction is a most plausible mechanism of the action of privine.

The vasomotor rhinitis ensuing from the prolonged use of privine has become one of their most common medical problems in office practice. The definite amelioration of this troublesome congestion following the discontinuance of the drops has been one of the most dramatic experiences they have witnessed.

They summarize their findings as follows: privine hydrochloride used in drops, commonly results in a rebound congestion of the mucosa. This action is due primarily to the vasodilatation as a reaction from the intense vasoconstriction. Other nasal vasoconstrictors may perhaps produce similar effects, but to a less striking degree. In their practice, however, congestion from the continued use of other constrictors has been noted rarely. The discontinuance of all nasal medication usually results in the alleviation of congestion in a week or less. It is to be recommended that the use of privine in commonly used concentration be discouraged in all cases in which prolonged nasal medication is desired. It is possible that further experimentation may indicate that weaker solutions may be better tolerated.

Waring<sup>26</sup> reported three cases in which privine hydrochloride produced sedation. This effect might not have been anticipated from the general character of the drug, which gives a complicated type of systemic stimulation in animals.

He noted that Bonzanigo reported ephedrine had been found to produce sedative effects frequently in children between the ages of three months and 14 years.



*Case 1* was a girl, aged seven years, with vasomotor rhinitis, who had been given a prescription which directed that five drops of privityne hydrochloride (0.1 per cent solution) be taken in each nostril three times a day. Consistently after each administration the patient felt drowsy and talked vaguely for several hours. After the drops were omitted, she seemed normal.

*Case 2* was that of an infant girl, aged three months, with acute rhinitis, who was given a prescription for privityne hydrochloride (0.05 per cent solution) to be used as two drops in each nostril every four hours. After each treatment she slept for about eight hours, so that ordinarily the drug was given only at eight-hour intervals. On one occasion she was definitely drowsy for 24 hours after receiving only two drops of the solution. No similar effect was noted when another preparation (neosynephrin 0.25 per cent) was used.

*Case 3* was that of a boy, aged three years, who drank an uncertain amount of privityne hydrochloride 0.05 per cent solution, probably 7 or 8 cc. He soon became quite drowsy and remained so for several hours.

No class of drugs is more widely distributed and used than are nasal vasoconstrictors. This is due to advertising of "patent" nostrums in press and radio, to exploitation of new compounds to the profession by pharmaceutical houses, and to wide prescription of these drugs by physicians. Tabulation reveals that there are nationally distributed at least 240 nasal vasoconstrictor compounds in the form of drops, sprays, inhalants and ointments. It is timely to question whether the increased use of vasoconstrictors is justifiable and whether there are not disadvantages inherent in these drugs which demand a reappraisal of the indications for their use.

Kully<sup>27</sup> discusses the pharmacology of these drugs, the factors affecting secondary vasodilatation, the indications for their use, with special consideration of vasoconstrictor medication in acute rhinitis. He summarizes his article as follows:

A revaluation of the increased use of nasal vasoconstrictor medication is indicated. The primary vasoconstricting effect of sympathomimetic drugs is usually followed by secondary vasodilatation. This secondary vasodilatation is influenced mainly by the type and amount of the drug employed and the sensitivity of the individual vasomotor mechanism. The addition of antiseptics, particularly sulfathiazole solutions, to vasoconstrictor drugs increases the irritant properties without compensatory therapeutic benefits. Judicious use of vasoconstrictive medications is indicated in surgical, manipulative

and displacement procedures and in some acute nasal infections, notably acute sinusitis. The indiscriminate use of this medication in acute rhinitis lengthens the course of infection and increases the incidence of sinus and otitic complications. Vasoconstrictor drugs may of themselves produce a vasomotor rhinitis indistinguishable from that due to allergy. Vasomotor rhinitis, allergic in origin, is made more severe by constricting medication. The use of vasoconstrictor drugs in chronic obstructive pathologic conditions adds the factor of secondary congestion to the obstruction already present.

In the discussion which followed, Boies expressed his conviction that any local treatment introduced into the nose in an acute rhinitis has little therapeutic value, and thinks that too many medical men are still imbued with the idea that a stuffy nose or chronic headache must mean an independent disease of the nasal fossae or sinuses, or both. Kully met Van Alyea's comments by stating that he did not advocate the complete cessation of the use of vasoconstrictor compounds, but thought there were conditions when their careful use was justified. He stated that his purpose was to call attention not only to the use of vasoconstrictors by rhinologists but also to the vast use of these drugs by the public. The newspapers and radio advertise them, the chain drug stores high pressure their sale. There is a tremendous amount of this type of medication being used, and he thinks it is up to the rhinologists to educate the public that inherent in these drugs are harmful effects as well as benefits.

Van Alyea's<sup>28</sup> well illustrated article states that the middle meatal approach to the maxillary sinus for the purpose of irrigation is gaining favor as more and more rhinologists become acquainted with the advantages of this route over that of the inferior meatus.

The maxillary or an accessory ostium is available for catheterization in the majority of cases and this fact alone should justify a widespread adoption of the procedure.

The technique advocated calls for the use of the middle meatus exclusively in antrum lavage and this in large meas-

ure eliminates the distressing features of the procedure as it is usually carried out.

In this approach a search is first made for an accessory opening, then for the maxillary ostium. In the event that no opening is found readily, a sharp-pointed cannula is pushed through the membranous portion of the nasoastral wall. The site for puncture is just above the inferior turbinate, slightly posterior to the midline.

Objections to the middle meatal approach are raised, yet similar objections, with the addition of others, apply to the inferior meatal approach.

*Comment:* The implication in this paper is that early training in the inferior meatal approach and inability to train themselves to the middle meatal approach are the main factors which prevent wholehearted adoption of the latter route. The reader is directed to arguments against washing the antrum via the natural ostium in reference 48.

*Comment:* Louis, in discussing the paper, has admitted that he had had the experience of entering the orbit in entering the sinus with a dull cannula. He drew attention to the fact that anatomists consider that in only about 20 to 25 per cent of cases is the natural opening available, but comments that they are dealing with tissues made rigid by preservatives and that he believes clinically the natural opening is available in 80 to 85 per cent.

The local systemic possibilities of low-voltage galvanism in the treatment of infection has been neglected in the course of modern progress and discovery. A quick and effective treatment of the accessory sinuses was developed in the clinic of Prof. Voss at the University of Frankfurt. Kupfer<sup>29</sup> states that unfortunately this method was hardly known in England. He states that the treatment has been effected in hundreds of cases with quick and satisfactory results, and in the paper he gives a brief description of his method.

The sign of the electro and the quantity and density of electricity are important factors—the source of the current

seems of minor significance. Generally speaking, he found the variations of the constant current from a low voltage grid-bias battery more effective than any treatment by transformers from the main. Consequently the apparatus required is of the simplest description and can be procured at very little expense. The technique is easy to acquire.

This article must be referred to in the original and it is hoped that by directing the attention of American readers to the article the method will be tried under such circumstances as to prove or disprove the contention of the author.

#### NASAL ALLERGY.

A short, clearly expressed paper on nasal allergy for the practicing rhinologist is contributed by Shambaugh.<sup>30</sup> Many explanatory tables are given.

It is divided into three sections and a summary follows each.

The normal nasal and sinus mucosa is able to recover spontaneously from most acute infections. The allergic sinus mucosa may be unable to throw off even mild acute infections, which then proceed to become chronic. An underlying nasal allergy is responsible for the chronicity of at least 70 per cent of all cases of chronic sinusitis and at least 90 per cent of all cases of chronic rhinitis. Cases of chronic sinusitis can be sharply and accurately differentiated into two etiologic varieties: the pure infective sinusitis due generally to an anerobic type of streptococcus, and the allergic sinusitis due to an underlying nasal allergy with secondary infection. The best therapeutic results will follow only when the infection and the allergy are treated simultaneously and this can be accomplished best by the rhinologist who makes his own allergic studies.

From the character of the patient's symptoms, the appearance of the nasal mucosa, and the finding of eosinophiles in the nasal smear, a nasal allergy is suspected. To find the offending allergen, we have the patient's history, the skin test, the elimination diet and the therapeutic test. In the last analysis, the proof of an allergy depends upon the therapeutic

test. When removal of a specific substance or treatment with an extract from it results, in recovery from the symptoms, and when exposure to the substance again produces the symptoms, we may regard this as the allergen responsible for the trouble. A frequent mistake is to rely upon skin tests, rather than the therapeutic test for diagnosis. A skin test must be regarded as an aid but not the means of diagnosis.

A large proportion of the patients seen in office practice of otolaryngologists suffer from chronic nasal symptoms on an allergic basis, frequently complicated by super-imposed infection. The best therapeutic results can be obtained only when both factors are treated simultaneously and this can be done best by the rhinologist who makes his own allergic study. History, stained nasal smear, skin tests, elimination diet and therapeutic tests are the methods at our disposal in the diagnosis of a nasal allergy. Sensitivity to house dust is a major factor in most nasal allergy encountered in rhinological practice. Therapeutic response to injections of house dust extract is very satisfactory in the great majority of cases.

#### PHYSIOLOGY.

Parkinson<sup>31</sup> discusses and criticizes determinations of intranasal Ph in an article which should be studied in the original. He summarizes his article as follows:

Living tissues are perfused with body fluid, the physical properties of which are maintained at nearly constant values. Secretions and excretions on body surfaces are not body fluids but are non-living fluids, the physical characteristics of which are uncontrolled and ever changing. Nasal mucous membrane is living tissue perfused with body fluid. Nasal secretion is non-living fluid, the properties of which change continually as the result of many environmental factors. These changes are not to be interpreted as necessarily purposeful.

Confusion is evident in such experiments as have been reported for the determination of intranasal Ph. The cause lies chiefly in unawareness that within the nasal chambers are two distinct sources of hydrogen ion concentration: living tissue and non-living secretion. The intranasal electrode unavoidably contacts both, responds to both and, therefore,

gives a combined value. Misleading, therefore, are reports of *in situ* determinations of Ph as specifically of secretion or of membrane wherein these conditions have not been accounted for. By recognition of a valid premise it is hoped that experiments will lead to more valid and more useful conclusions.

#### TONSILS AND ADENOIDS.

##### *Upper Respiratory Clinic for Children.*

Dissatisfied<sup>22</sup> with the criteria for the removal of tonsils and adenoids in children, and the investigation of their recurrent respiratory infections as a whole, the staff of the Ear, Nose and Throat Department of Willesden General Hospital decided to form a special clinic to go into these subjects. The child is an entirely different problem from the adult. In the child it should be possible to correct disability while it is in the stage of dysfunction and before it has reached an established pathological state. It was hard to keep this point of view when seeing children mixed up in a general clinic; therefore, an ear, nose and throat clinic for children only was started. In opening a discussion at the Royal Society of Medicine on March 2, Mr. F. C. W. Capps and his colleagues explained that the clinic aimed at encouraging repeated attendance so as to avoid a quick decision at a single isolated consultation, to record progress, and to maintain a state of environmental defense. A scheme of investigation, starting with an assessment of social conditions and environment by the Social Welfare Department, followed by clinical examination, radiography of the accessory sinuses, soft-tissue radiography to exclude an obstructive pad of adenoids and screening of the chest was laid down. Ideally the upper and lower respiratory tracts should be considered as a whole, and to this end it was intended to have a pediatrician associated with and probably controlling the activities of the clinic. Owing to wartime shortage of staff, this has not been possible, and a rhinologist with past experience of general medicine has been in control. Special attention has been paid to the evolution of the mouth breather, particularly those in whom operations for the removal of enlarged tonsils and adenoids has been a total or partial therapeutic failure. Nor-



mal nasal respiration depends on the efficiency of a series of muscle-group activities, starting with the maintenance of facial symmetry and dilatation of nasal alae, followed by closure of the isthmus of the fauces by interaction of the tongue and palatal musculature, and finally, recurrent and rhythmical deglutition to remove secretion and debris from the post-nasal space. It was realized that such musculature must have a properly orientated scaffolding on and from which to work. This postulated a normal craniomandibular relationship, and to assess this factor an orthodontist was included in the team. The functional evaluation of coordination and control of the palatolingual and respiratory musculature was deputed to the speech therapist.

The aim throughout has been to restore conditions for a normal respiratory exchange and deglutition by reconstituting a normal bony structure of the jaws; removing obstructive or diseased lymphoid tissue which will not respond to environmental and conservative therapeutics; clearing occluded areas in the nose and accessory sinuses by conservative measures where possible, but by lavage or even operation in persistent occlusion or chronic infection; and finally, restoring the activities and tone of the various muscle groups concerned. At the same time the child's general health and posture have been under constant supervision.

The team has so far consisted of social worker, rhinologist, orthodontist and speech therapist, and close cooperation has been demanded from the Radiological Department. There is scope for much more social welfare investigation than has been possible in war years and the incorporation of a pediatrician is an urgent requirement. Without him the assessment of the lower respiratory factors is necessarily incomplete. The virtue of the team is their presence together at the clinic and the facility thus afforded for immediate consultation on any aspect of each case. Starting at the end of 1942, during 1943 and 1944 there have been 1,000 new cases and some 4,500 attendances for following progress. During 1943, operations for removal of tonsil and adenoids were performed on 48 per cent of the new cases; in 1944 on 36 per

cent. Enemy activity has made follow-up and attendance irregular, but the scheme is anyhow in its infancy and no definite conclusions are claimed. Expenses from the radiological and orthodontic aspects alone are high, not to mention adequate accommodation, and salaries of social welfare and other workers; so this is an experiment not to be copied until it can be shown to give results superior to those attained by isolated consultative clinics.

A correspondent<sup>33</sup> stated that in his opinion too many tonsillectomies and adenoidectomies were being performed and too many doctors considered the operation without danger and told the parents so; he asked the *Journal of the American Medical Association* for data on the number of deaths per year in the United States caused by tonsillectomy, with the reply that the figures requested were not readily available. Life insurance company statistics are not very informative, and the Bureau of the Census states that exact figures on the number of deaths caused by tonsillectomies each year cannot be supplied, partly because no distinction is made in the classification of death between tonsillitis and postoperative complications of tonsillectomy.

Failure to separate deaths among children from those among adults and failure to separate those due to local anesthetics as distinguished from those due to general anesthetics makes reporting difficult; however, Fowler states that in a group of approximately 250,000 tonsil and adenoid operations performed in all parts of the United States between the years 1915 and 1925 there were 33 deaths which occurred within 24 hours after operation. Four of these deaths were due to injection of cocaine and four were due to injection of some other local anesthetic. Three deaths followed general anesthesia (type of anesthetic used not stated). The chief cause of death was hemorrhage, of which there were 14 instances; other causes were the cutting of the internal carotid artery and the cutting of the anomalous blood vessels; embolism and epilepsy accounted for six deaths.

If one assumes that the inquiry relates chiefly to children and deducts those deaths due to the use of local anesthetics,



there is a still smaller number, assumed to be children, who die within the first 24 hours after operation; roughly, less than one in 10,000. There are of course later deaths from pneumonia, lung abscess and other causes, but there is no way of getting accurate figures in these cases.

Tonsillectomy and adenoidectomy are the most commonly performed surgical procedures in the United States. It is perhaps true that they are frequently recommended when proper indications do not obtain, and it is also true that these operations are not lacking in danger. Even if death is not common following the operation, there are complications which are not pleasant, chief among which is hemorrhage, which may reduce the patient's vigor and health for weeks afterward.

Hence tonsillectomy and adenoidectomy is not different from any other surgical intervention and should not be undertaken without adequate reason.

A correspondent,<sup>34</sup> writing to the *Journal of the American Medical Association*, stated that he had the thymus glands of all children, seven years old and younger, X-rayed prior to tonsillectomy and asked if this precaution were necessary. The reply follows:

"The caution displayed by the writer is commendable; it is, in fact, displayed by many practitioners in the country if not quite so directly. For instance, children who are under the care of pediatricians and who have their tonsils removed by these pediatricians, or who have been referred by them to others for operation, are presumed to have had fluoroscopies of the chest on a number of preceding occasions, if not with direct reference to the tonsillectomy or other operation. As to the rationale of this examination, the following may summarize good current opinion: Status thymicolymphaticus is a condition characterized by generalized lymphoid hypertrophy and hypoplasia of the cardiovascular system. The thymus gland may or may not be hypertrophied in this condition. The thymicolymphatic state is a condition which many people think is an adequate explanation for easy death under a variety of circumstances. The presence, however, of an en-

larged thymus gland does not mean that the patient suffers from status thymicolymphaticus; its discovery should lead to a search for the other conditions mentioned and its absence does not mean that they may not be present."

In general, then, this means that a special fluoroscopy for the presence of an enlarged thymus gland is not a protection against the sudden and mysterious death said to be associated with status thymicolymphaticus but does mean, on the other hand, that every patient who submits himself to a surgical procedure of any degree should have a complete physical examination with note made of all important physical observations, including the presence or absence of the thymicolymphatic state.

The incidence of secondary post-tonsillectomy hemorrhage is stated by Singer<sup>35</sup> to be practically negligible in the operating clinics and hospitals of Central Europe and he states that textbooks published in Central Europe do not mention it. Inasmuch as the methods of operation and the technique employed in the United States and in Europe are the same, it appears obvious that the difference in the postoperative course is due to some other factor. Secondary hemorrhage preceded by hemorrhagic inflammation of the soft palate is observed as a complication of the post-tonsillectomy course in a comparatively great percentage of cases in the United States. A postoperative regimen free from acetylsalicylic acid in a series of 75 cases resulted in the conspicuous absence of hemorrhagic inflammation and also of secondary hemorrhage in all instances. The prothrombin-lowering effect of salicylates described by a number of authors seems to be a plausible explanation for the occurrence of secondary post-tonsillectomy hemorrhage.

Tonsillectomy and adenoidectomy are not infrequently complicated by secondary hemorrhage occurring generally on the sixth or seventh day. Neivert<sup>36</sup> learned that in Europe these secondary hemorrhages are much less frequent and the difference seems significant and that acetylsalicylic acid is extensively prescribed in this country as it is also in Canada and Europe, whereas in Central Europe aminopyrine is the

drug of choice. Workers in the Department of Biochemistry of the Wisconsin Agriculture Experiment Station showed that salicylic acid and sodium salicylates induced hypoprothrombinemia in rats kept on a ration low in vitamin K. The animals could be protected against this action of salicylic acid by administration of a vitamin K preparation. Estimations of prothrombin time done on a large number of patients at the author's hospital revealed that in some subjects a daily dose of 2-4 gm. of acetylsalicylic acid will produce an elevation in prothrombin time on the next day, whereas in others it will be much longer before a significant rise will be discernible — but such a rise will occur eventually. These studies afford corroboratory evidence that administration of salicylates results in hypoprothrombinemia. In view of the fact that acetylsalicylic acid, by virtue of its effectiveness and its comparative nontoxicity, is a most widely used analgesic, the author thought it advisable rather than to eliminate it to combine it with an agent which will counteract its effect on prothrombin. The water-soluble vitamin K-like compound synkayvite prevents this undesirable side effect of acetylsalicylic acid. The combined acetylsalicylic acid and synkayvite medication was tried on a broader scale. Only four among 283 patients were troubled by late tonsillar bleeding. The author concludes that while in rare cases the cause of late post-tonsillectomy hemorrhage may be trauma, menstruation, infection, deficiency of vitamin C or some blood dyscrasia, observations suggest that one of the most important factors is a reduction in the prothrombin of the blood brought about by the use of acetylsalicylic acid or salicylates.

#### MOUTH AND THROAT INFECTIONS.

The eradication of hemolytic streptococci from the throat by the use of sulfonamide lozenges has been attempted many times with varying results. Some maintain the method to be valuable and others that it is useless. The latter viewpoint is supported by a carefully controlled study by Vollum and Wilson.<sup>97</sup>

They show that a prophylactic dose of 6 gr. daily of mixed sulfapyridine and sulfathiazole given in the form of lozenges

is unable to protect children from streptococcal infection: and that neither 6 or 12 gr. daily for five to seven days is able to clear streptococci from the throats of healthy or convalescent carriers.

These conclusions are supported by reports from three British investigators but are at variance with certain American observations. What is the cause of the discrepancy between the British and the American experience? It may be objected that the British observations were on far too small a scale to admit of any reliable deductions being made from the results. Though not denying that the test population was numerically insignificant compared with that of Holbrook or of Coburn, they point out that the observations were made in residential schools, where the exposure to risk was relatively uniform, and that they were carefully controlled bacteriologically. Under such conditions, they believe that the complete failure of sulfonamides, in a dosage similar to that used by the American workers, to exercise any prophylactic or therapeutic effect, cannot be dismissed as unimportant on statistical grounds. The method used by Holbrook and by Coburn — and also by Garson (1943), who reported good results from the prophylactic administration of 4 gr. of sulfanilamide a day in lozenge form — was to treat some units in the Army and Navy, leaving other units to serve as controls. The wisdom of this procedure seems to them to be questionable. It is impossible at present to foretell how streptococcal infection will develop in any segregated or institutional population, even when the distribution of infection has been carefully mapped out by bacteriological means beforehand. Experience of several outbreaks investigated by the Oxford laboratory has shown that a low carrier rate may be followed by numerous cases, and a higher carrier rate by few. Similar observations have been made by Hamburger (1944) in the spread of streptococcal infection in American Army Hospital wards. It is, therefore, hazardous to draw conclusions from the behavior of an infection in different units. Even in similar populations of mice, all infected with *Bact. typhimurium* in the same way at the same time, Topley and his colleagues (1928) found that the mortality rate and

average survival time might vary considerably. Instead of treating all men in alternate units, it would be more satisfactory to treat alternate men in the same units. That is what Hayden and Bigger (1945) did in their trials of prophylactic sulfanilamide treatment in the British Army. The negative results that they obtained are all the more significant.

Their conclusion, therefore, is that a case has not yet been made out for mass prophylactic treatment of populations exposed to streptococcal infection; and that before such a method, attended by disadvantages and dangers that it is unnecessary to discuss here, is adopted as a routine in the fighting forces or for the civilians of Britain, further trials should be made under adequately controlled and statistically satisfactory conditions.

One other point requires discussion. Special virtue has been claimed for local sulfonamide therapy to the throat in the form of either sprays or lozenges (Arnett, *et al.*, 1943; Garson, 1943; Freis, 1944). They have had little experience of sprays, but the combined observations of Kidd (1944), of Hayden and Bigger (1945) and of themselves seem to show that, so far as the prevention or cure of streptococcal infection is concerned, sulfonamides given in the form of lozenges in a total dose of 7 to 15 gr. ( $\frac{1}{2}$  to 1 g.) a day have little or no effect. Puzzling over the reason for this failure, they were prompted by a suggestion of Dr. Calman, in their laboratory, to find out how closely the contents of a lozenge came into contact with the throat and posterior wall of the pharynx. For this purpose, 22 of their laboratory staff sucked a pill containing 2 gr. of methylene blue for about five minutes, swallowing the saliva at intervals. Their throats were then carefully inspected in good daylight. The results were striking. Though the lips, tongue, mouth, hard palate, uvula and anterior pillars of the fauces were stained deep blue, either no blue at all or, more frequently (16 out of 22 subjects), a slight coloration only, could be detected on the tonsils — usually confined to a small area at the top in between the angle formed by the anterior and posterior pillars of the fauces. Except in two instances, in which there was a very faint

streak on each side of the midline, no blue coloration at all could be detected on the posterior wall of the pharynx. Subsequently it was found that Arnett (1943) had carried out a similar experiment using chewing gum impregnated with gentian violet or methylene blue, and had observed little or no staining of the tonsils or posterior pharynx if the subject chewed his gum in the upright posture; some staining, however, usually occurred if the recumbent position was adopted.

Thinking that their results might have been different if their subjects had not had healthy throats, they made observations on six patients in the isolation hospital who were suffering from measles or scarlet fever and whose tonsils were greatly enlarged. The pills were sucked in a semi-recumbent position, which, in view of Arnett's findings, may have affected the result. In one patient the whole of the medial surface of the tonsil was stained light green; in the remaining five the coloration was slight and was restricted to a small triangle at the top. In no instance was any coloration of the posterior pharyngeal wall seen.

These findings are in accordance with the observations of Bloomfield (1922), who concluded from an extensive series of experiments that there is a highly efficient mechanism, apparently dependent on suction currents, by which any bacteria introduced into the mouth are drawn directly backwards towards the esophagus, avoiding the tonsils and posterior wall of the pharynx. It follows, therefore, that drugs given in the form of lozenges or chewing gum can have little or no effect on the throats of persons in the upright or sitting position unless they are sucked almost continuously throughout the day and night, as in MacGregor and Long's (1944) observations on penicillin pastilles. They are, therefore, unlikely to be of much value for prophylactic purposes in the ordinary healthy contact.

The effectiveness of penicillin as an antispirochetal agent in the treatment of syphilis, relapsing fever, Weil's disease and rat bite fever prompted a study of its use in Vincent's infection.



Vincent's infection of the tonsils, although subject to recurrence, is an acute illness and is almost always a primary infection.

Schwartz<sup>28</sup> reports the results of treating 14 cases of Vincent's angina with penicillin. The local lesions on the tonsil or pharynx had the following features in varying severity and combination: hyperemia, ulceration, exudation (pseudomembrane), bleeding, characteristic odor, submaxillary lymphadenopathy, edema and associated mild gingivitis. The symptoms in every case were pronounced. Pain in severe cases was so intense that solid food was refused. In some cases the symptoms were out of proportion to the physical findings.

In each case a dried smear of exudate from the lesion was positive for *Borrelia Vincenti*. No smear was considered positive unless there was an unequivocal profusion of characteristic spirochetes and fusiform organisms present. In addition in several cases throat culture was negative for other pathogenic organisms. The differential leucocyte count revealed no abnormal cells.

Penicillin was injected intramuscularly in each case. The intramuscular route was chosen in preference to local application for several reasons. Studies of the effect of penicillin on other micro-organisms have shown that it exerts its maximum effect after six to eight hours of contact. Without knowing the length of the time locally applied penicillin remains in contact with mucous membranes, one would find it hard to advise rational dosage schedule. The ease with which locally applied penicillin will penetrate to the depth of an exudate covered with ulcers is unknown. Furthermore, it has been shown that parenterally injected penicillin is secreted in the saliva; thus, when the intramuscular route is employed the deep portions of the local lesion will be constantly attacked by penicillin conveyed in the blood stream, while the superficial portions will be continually bathed by the penicillin present in the saliva.

The first two patients to be treated were given a total of 200,000 units of the sodium salt of penicillin administered in

20,000 unit doses every three hours intramuscularly. The response was so satisfactory that all subsequent cases with three exceptions had the dosage reduced to 100,000 units administered in 20,000 unit doses every three hours. The result in each case treated was satisfactory. In every instance subjective discomfort was decidedly alleviated in 24 hours and completely eliminated in 48 hours. In every instance the smear which was positive before treatment became negative after treatment. The appearance of the lesion also improved remarkably, although this improvement was not as dramatic as the relief of subjective symptoms and the disappearance of the organisms from the smears. The exudate and ulcer required from one to 10 days for complete disappearance, depending on the initial severity of the lesion. No recurrences have been observed.

The results demonstrate that penicillin is an effective agent in the treatment of Vincent's angina. From the author's experience it is definitely superior to hydrogen peroxide or sodium perborate gargle. Several of the patients had received these medications before penicillin was started, with slight or no improvement and continued positive smears after 24 to 48 hours.

Shallenberger, Denny and Pyle<sup>30</sup> studied 35 cases of Vincent's angina who were treated in four ways, one of which was treatment with penicillin by local application. The method was as follows: First, the involved tissues were swabbed with penicillin in a concentration of from 250 to 500 units per cc., four times daily. Second, daily smears were obtained. Treatment was continued until the smears were negative for Vincent's organism. No other supportive treatment was administered, although acetylsalicylic acid 5 gr. was given as indicated for the relief of pain. As the investigation progressed, the concentrations of the penicillin solution used were maintained at 500 units per cc.

Their study demonstrated that penicillin is a remarkably effective agent in the treatment of Vincent's infection. The efficacy of penicillin in Vincent's angina is of importance not only because of the special sensitivity of Vincent's spirilla

and fusiform bacilli but also because it is more rapidly effective than the methods heretofore advocated. A favorable response was obtained in all cases treated locally. They conclude that topical application of penicillin in a concentration of 500 units per cc. applied four times daily is a complete and rapid therapeutic procedure in the treatment of Vincent's infection.

In a letter to the *Journal of the American Medical Association*, Johnson<sup>40</sup> comments on the above articles in the use of penicillin in Vincent's angina. He does not question the effectiveness of penicillin, but suggests that nicotinic acid or nicotinamide has been found by himself and a number of others to be just as effective as penicillin in such cases. Since it is much simpler to take a 50 mg. tablet three times a day than to have an intramuscular injection every three hours for five doses, or even to have penicillin applied locally every four hours, it seems logical to him to use nicotinic acid first. So far as he knows, J. B. King first called attention to the effectiveness of nicotinic acid in Vincent's disease in the *Lancet* of July 13, 1940. For nearly four years he has been using it in all acute cases of Vincent's angina and has found it eminently satisfactory. The dose employed is 50 mgm., three times a day, for adults; for children, 10 mgm. and upward according to age. A week's treatment is usually sufficient. The temperature in all his cases has subsided within 48 to 72 hours and the smears have been negative within four to seven days.

#### FRACTURE DISLOCATION OF THE NOSE.

Maliniac<sup>41</sup> contends that while the pathology and the treatment of bony nasal fractures are well established, the results of injury to the cartilaginous component of the nose, being less definite, are often misinterpreted. He discusses dislocation of the cartilaginous nasal structures and their relationship to external deformities and outlines a method of reconstruction based on the anatomic changes resulting from trauma.

The position of the septal cartilage in the vomerine groove and its relationship to the other cartilages and to the bony

framework constitute the key points of the cartilaginous structure of the nose. He considers that displacements and fractures of the nasal cartilage in early life should be promptly corrected, otherwise they interfere with normal growth of the nose and permanent deformity results.

Some of the procedures that have been suggested for the correction of the deformities he finds inadequate because they fail to take into account pathological changes which occur in fracture dislocations of the nasal cartilage.

The main points of the method of repair that he recommends are wide exposure of the cartilages involved and reconstruction of all changes in the cartilages themselves, as well as in their relationship to the nasal framework. Complete release of all adhesions at the time of surgical repair is essential. No reliance should be placed on postoperative traction. The photographs and drawings together with the text should be studied in the original.

His remarks regarding repair work in children are few but his point of view regarding them apparently is quite definite. He states that in infants and young children the septum is nearly always straight. Only at the age of seven or eight years does septal deviation start to appear. Histologic examinations have shown that a post-traumatic bend of septal cartilage occurring in early life often results later on in ossification and distortion of the cartilage. The resetting of displaced cartilages and bone should preferably be carried out in the first 48 hours after injury. Early treatment is of cardinal preventive importance, particularly in children in whom delay results in developmental abnormalities. With the use of a local anesthetic, early resetting of the septum can be performed even in children. The dislocated quadrangular cartilage is raised and pushed back into the vomerine groove and above the nasal spine. If resistance to digital correction is encountered, the nasal tip and septal cartilage are forcibly lifted forward and pressed to the midline. A periosteal elevator protected by rubber tubing can be used if necessary. The cartilage can best be maintained in place by mattress sutures tied over the dorsum and the columella on a piece of

gauze and by endonasal packing. Where a number of days have elapsed since the injury, resistance may be encountered. After a week to 10 days, fibrous tissue formation will interfere with adequate mobilization, and the cartilage becomes thick to the side of the vomer. Here open resetting of the septum is required. This is done through an incision of the mucous membrane along the floor of the nose with free exposure of the dislocated area. Mattress sutures carried through the nasal cavity will assure proper fixation. Nasal cartilages are easy to reset but rather difficult to maintain in place. If packing is used as additional support for the mattress sutures, it should be placed in the angle of the vault between the lateral wall and the septum, above a breathing tube located along the floor of the nose.

[*Comment:* The writer's conclusions have been given as printed. The statements regarding children are very definite, but there is, however, no statement as to how many young patients he has operated on and what the results have been.]

#### SURGERY.

A symposium<sup>42</sup> on the causes of failure in the surgical treatment of chronic frontal sinusitis at the Royal Society of Medicine is candid and illuminating. Bedford Russel started the discussion by stating that he wondered how many rhinologists could face with equanimity a parade of all their operative cases of chronic frontal sinusitis. He points out how it has been the fashion to temporize with frontal sinusitis and how one operation after another would be done and only when every conceivable other procedure had been taken would a direct attack be made upon the frontal sinus. As the result of his experience he now advocates much earlier diagnosis and open operation upon the frontal as a first step, instead of as an appendix to multiple palliative operations.

A common cause of failure is regarding the frontal sinus as an isolated offender. He regards sinusitis as originating in the diffuse inflammatory processes associated with the exanthemata, influenza, pneumonia and the like. The sinusitis is usually catarrhal at the outset and yields to suitable

palliative treatment. If children's sinuses are examined after convalescence from such illness, there is clinical and radiological evidence of sinusitis in a percentage of them. He recalls one case following measles in a child of 10, in which the frontal sinuses were found crammed with inflamed polypi, and there was already a frontal lobe abscess; but as there was no pus in the nose it had been thought that he could not have sinusitis.

The diagnosis of sinusitis does not depend upon the presence of visible pus, for the tissues respond to streptococcal invasion by the production of edema rather than pus. He has had cultures made in many cases from the submucosa of the frontal after sterilization of the surface of the membrane, and found a copious growth of pathogenic organisms in cases where no pus has been seen clinically. It is important in frontal sinus cases to have anaerobic cultures: the infection in frontal osteomyelitis is an anerobe. In one case, anaerobic cultures from the anterior of a polypus grew a staphylococcus, which did not come up until the fifth day.

In cases of catarrhal inflammation which do not receive suitable palliative treatment, the infection may persist after the symptoms have disappeared to recur with increasing local damage, with or without pus, with further upper respiratory infections until the swelling happens to force recognition by the occurrence of sinus block. So that the behavior of a sinus in response to operative treatment is conditioned by previous tissue damage, and although he cut ever so wisely, the surgeon's results are, to some extent, determined by matters outside his control. This view calls for recognition of catarrhal frontal sinusitis while the local changes are reversible, and the immediate institution of suitable palliative treatment. He is in favor of wider recognition and palliative treatment of the catarrhal stage, which will often prevent the need for operation years later.

Valuable comments upon the above are made by Howarth, Paterson, Brown and Layton. Negus disagreed. In chronic frontal sinusitis he thought that he and the majority of rhinologists were agreed that everything possible should be



done inside the nose first before any external operation was attempted. He had strong views about that. For example, he saw a certain number of cases which had failed because the septum had not been put straight. It was impossible to expect the frontal sinus to show satisfactory recovery if the nasal fossa on that side were much obstructed. Sometimes the maxillary sinuses or ethmoidal cells have not been dealt with properly. He would, therefore, make every effort to cure the patient's frontal sinusitis by intranasal treatment. He did not subscribe to the opinion that the patient must not be submitted to a second operation and that the first operation must be so thorough that the patient would not require another. He saw no objection to a second operation if this were necessary. He would reserve the external operation for cases which had failed with simpler measures. In acute fulminating sinusitis, from practical experience, he thought that the solution would lie in the treatment of the maxillary sinus by lavage, together with penicillin.

Goodale<sup>43</sup> comments on the causes for failure in radical surgery of the frontal sinus and describes a new method for the maintenance of drainage from the frontal sinus after frontal sinus surgery where it is definitely unlikely that the nasofrontal passage will remain patent. He states that eight patients have been operated upon during the past two years with satisfactory results. He reports four of those cases to illustrate the technique and indication. One of the patients was a girl, age 15, who had multiple left frontal sinus operations. Following each operation he had attempted to keep the nasofrontal passage open by dilating the duct with a nasofrontal probe. In spite of repeated attempts at regular intervals, the passage narrowed until it had completely disappeared. At his final operation he found there was complete obstruction to drainage due to scar tissue and regeneration of bone near the nasal spine. The obstructing tissue was removed and he used tantalum foil with success.

The metal tantalum was chosen because it had been shown to be inert in animal tissue and can be cut and fitted easily at the time of operation to the area to be covered. This is one

of the few metals which are inert and cause no tissue reaction.

He sutured a slip of tantalum foil to the orbital periosteum at about the position of the pulley. The foil was then carefully placed so that it was in contact with the orbital periosteum and extended medially and downward into the upper part of the nasal fossa. The suture material was 0.003-inch tantalum wire.

Ruddy<sup>44</sup> states that congenital atresia of the choanae is being more frequently recognized, and in time, with members of the medical profession more informed, it is likely that this condition will be discovered earlier and earlier in life. While operations for its relief have been increasingly successful in adults and older children, they have been less successful in small children and in infants. In an attempt to improve the results in these young patients, a transpalatine approach was tried with success in a three-year-old child. Because of the rarity of this congenital anomaly and the remote possibility of presenting a series of personal cases, Ruddy reports a single case. He fully realizes that the outcome in this particular instance may have been a fortunate one; however, he hopes that this presentation may encourage other surgeons to test the merits of the operation. The article is well illustrated.

He reviews the transpalatine operation reported in the literature. His summary follows: The present-day treatment of congenital atresia of the choanae in the adult and the older child is successful. Operation by way of a submucous resection with removal of the obstructing wall and the posterior end of the vomer as proposed by von Eicken in 1911, and in this country by White in 1918, has given better results than the preceding Uffenorde operation. Kazanjian's recent method of displacement of the midnasal tissues for better removal of the posterior part of the septum and the atretic structure also seems to be a good procedure. These operations, however, are hardly applicable to the young child or the infant because of the very small size of the nares. Even if their application were possible, it is questionable whether the septum should be removed to the extent demanded by

them. Some laryngologists may prefer diathermic electrocoagulation for adults as an office procedure or as a procedure secondary to surgical destruction of the choanal plate. Bonham has used the latter method to advantage in older children who were under intravenous anesthesia.

A direct surgical approach through the nasal fossa in the small child or the infant has long been used, but with many failures. Successful results have often been obtained only by means of considerable after-care, which has been a strain on both the physician and the patient. That such varying results should occur is understandable, for operations with this approach are more or less blind and clumsy procedures. There can be no doubt that in addition to the frequent incompleteness of operation, trauma to adjacent tissues contributes to the reformation of a fibrous obstruction. Of these procedures, the one most apt to be successful seems to be one in which skin grafts are used, perhaps preferably split skin grafts.

In the new-born infant with complete bilateral choanal occlusion, the usual attendant difficulty in breathing leads to asphyxia and may result in death. Ronaldson's original description of the condition is most interesting. Its cyclic character has been stressed by Richardson and others. Immediate relief can be obtained by providing adequate oral airway. The tongue should be pulled forward away from the roof of the mouth and the posterior pharyngeal wall to provide this airway. Then, a breathing tube similar to but longer than that used by Blair in his operation for cleft lip, or a curved obturator like that used by New, can be inserted into the mouth and pharynx until such time as the infant develops the habit of mouth breathing or until the nasal obstruction can be safely removed by operation. Some operators may prefer immediate simple perforation and dilatation of the membranous atretic structure with the patient under local anesthesia. For the osseous occlusions in particular, a transpalatine approach is suggested.

As all members of the medical profession become better informed in regard to this rather rare congenital abnormal-

ity, its presence in the small child and the infant will be more frequently diagnosed. In an attempt to obtain more assurance of a successful result in these patients, a transpalatine operation was planned and was performed in a single case submitted in this article. The successful result in this case and comparison of the operation with other transpalatine operations indicate that the technique described has merits. It requires further trial.

Boyd<sup>45</sup> reviews the literature and evaluates the techniques in congenital choanal atresia. Cases of choanal atresia resolve themselves into two main groups: those in which the obstruction is unilateral and those in which it is bilateral. The cases in which atresia is unilateral seldom, if ever, present an emergency. The cases in which it is bilateral always present an emergency requiring expert care and should be diagnosed at birth. Anatomic repair should be undertaken as soon as the general condition of the child permits.

#### NEW GROWTHS.

Woodruff<sup>46</sup> reports the uneventful recovery after operation of a 13-year-old boy for the removal of a tumor diagnosed as fibro-osteosarcoma, slow growing but malignant.

For five years the right ear had appeared to be larger than the left. For two years dizzy spells had occurred about once a month at any time of day and usually lasted about 30 minutes. For a year or more there was partial obstruction of the right nasal chamber. Six months previously an operation had been performed, which the father had thought was for the removal of nasal polyp.

The right eye appeared to be lower and farther from the midline than its mate, and also slightly more prominent. A firm, immovable mass was palpated in the nasal portion of the right orbit. A large mass was found obstructing the upper portion of the right nasal chamber, pushing the septum over against the left lateral nasal wall.

The X-ray films showed a marked clouding in the region of the right ethmoid cells, especially the anterior cells, and the right frontal sinus. The bone structure was distorted and

thin, with apparent lateral spread of the ethmoid cavity. The right antrum was anatomically small, with a thickened membrane.

An external frontal ethmoid approach similar to that used by Jansen, and later by Lynch, was used under local anesthetic. The growth was first dissected from the frontal sinus and this portion removed, after which the expanded ethmoid capsule was thoroughly removed. At the conclusion of the operation the nasal chamber, the ethmoid area and the frontal sinus formed a single smooth-walled cavity.

The maxillary and sphenoid sinuses were not invaded, but the anteroethmoidal wall was pushed laterally and downward.

The gross specimen consisted of several pieces of a large tumor somewhat fibrous in consistency, though not very dense or very vascular. There did not appear to be a definite capsule and there were hollow spaces running irregularly through some portions.

The boy was discharged from hospital three weeks after operation and returned every few months for examination. He has remained in good health and has gained considerably in height and weight during the two years since the operation.

The author believes that because there were no symptoms or signs of recurrence of the tumor that the tumor was not malignant, and he thinks this is borne out by the history that the neoplasm was slow growing and came to its final size only after several years of development. He ascribes fibroma in this patient to irritation and interference with nutrition following an infected ethmoiditis, although at operation no definite evidence of infected disease was found. He admits, however, that he saw no way to prove that the tumor did not arise from a misplaced island of tissue.

The term cyst of the nasal floor is applied to prominences of the vestibulum of the nose, situated either just in front of or behind the apertura pyramidalis, extending to the lateral corner of the nasal floor and containing a liquid matter. Bernfeld<sup>47</sup> considers they are rather rarely encountered.

His material consisted of 21 atypical nasal-floor cysts and three typical nasal-floor cysts. Four of the patients were children.

As long as the typical or atypical cysts are small and cause no symptoms, any kind of treatment is superfluous. If, however, the growth of the cyst, suppuration or whatever reason makes its removal imperative, the procedure should be a radical one by peroral approach underneath the upper lip.

#### BIBLIOGRAPHY.

1. VAN ALYEA, O. E.: Management of Chronic Sinus Disease. *Ann. Otol., Rhinol. and Laryngol.*, 443, Sept., 1945.
2. KLINE, O. R.: Importance of Pathologic Conditions of the Nasopharynx to the Otolaryngologist. *Arch. Otolaryngol.*, 140, Feb., 1945.
3. ROSENBERGER, H. C.: Does Sinus Infection Affect Sinus Growth? *THE LARYNGOSCOPE*, 62, Feb., 1945.
4. HOVANIC, K. J.: The Portal of Entry of Poliomyelitis. *Arch. Pediat.*, 563, Dec., 1945.
5. TORREY, J. C., and REESE, M. K.: Initial Aerobic Flora of Newborn Infants: Selective Tolerance of Upper Respiratory Tract for Bacteria. *Am. Jour. Dis. Child.*, 208, Apr., 1945. (Reviewed *Jour. A.M.A.*, July, 1945.)
6. IRWIN, D. H., and FRANKEL, E.: The Child with Frequent Colds. *Brit. Med. Jour.*, 566, Oct., 1945.
7. MALLISON, F. M.: Correspondence on the Child with Frequent Colds. *Brit. Med. Jour.*, 667, Nov., 1945.
8. MILNER, G. C.: *Ibid. Brit. Med. Jour.*, 667, Nov., 1945.
9. SMITH, R. N. C.: *Ibid. Brit. Med. Jour.*, 742, Nov., 1945.
10. GRAY, F.: *Ibid. Brit. Med. Jour.*, 742, Nov., 1945.
11. GREIG, A.: *Ibid. Brit. Med. Jour.*, 703, Nov., 1945.
12. BECK, A. L.: Abscess of the Nasal Septum Complicating an Acute Ethmoiditis. *Arch. Otolaryngol.*, 275, Oct., 1945.
13. DYSART, D. R.: Diabetic Gangrene Involving the Sinus. *Arch. Otolaryngol.*, 143, Sept., 1945.
14. EBERT, E.: Acute Nasal Accessory Sinusitis Complicated by Purulent Meningitis with Recovery. *Arch. Otolaryngol.*, 48, Jan., 1945.
15. Editorial: Cavernous Sinus Thrombosis. *Lancet*, 87, Jan., 1945.
16. WHITE, J. W.: Penicillin Therapy for Thrombosis of the Cavernous Sinus in a 14 Months Old Child. *Arch. Otolaryngol.*, 147, Aug., 1945.
17. HEEZIG, A. J.: Cavernous Sinus Thrombosis with Recovery. *THE LARYNGOSCOPE*, 318, June, 1945.
18. FARQUHARSON, R. F.; GREY, P., and TOWNSEND, S. R.: Results of Penicillin Therapy. *Canad. Med. Assn. Jour.*, 1, July, 1945.
19. WOODWARD, F. D., and HOLT, T.: Local Use of Penicillin in Infections of the Ear, Nose and Throat. *Jour. A.M.A.*, 589, Oct., 1945.
20. PROETZ, A. W.: Cilia and Penicillin. *Ann. Otol., Rhinol. and Laryngol.*, 94, Mar., 1945.



21. PRIEST, R. E.: Treatment of Suppurative Paranasal Sinusitis with Repeated Irrigations of Penicillin. *Ann. Otol., Rhinol. and Laryngol.*, 786, Dec., 1945.
22. VAN ALYEA, O. E.: Modern Trends in Sinus Therapy. *Eye, Ear, Nose and Throat Mon.*, 125; as abstracted in *Canad. Med. Assn. Jour.*, 509, Nov., 1945.
23. TREMBLE, G. EDWARD, and SMITH, FREDERICK: Nasal Medication in Sinusitis. *Canad. Med. Assn. Jour.*, 564, Dec., 1945.
24. JAMES, J. A.: Local Chemotherapy in Paranasal Sinusitis. *Jour. Laryngol., and Otol.*, 323, Aug., 1945.
25. FEINBERG, SAMUEL M., and FRIEDLAENDER, SIDNEY: Nasal Congestion from Frequent Use of Privine Hydrochloride. *Jour. A.M.A.*, 1095, Aug., 1945.
26. WARING, J. I.: Sedation as an Unexpected Systemic Effect of Privine. *Jour. A.M.A.*, 129, Sept., 1945.
27. KULLY, B. M.: The Use and Abuse of Nasal Vasoconstrictor Medications. *Jour. A.M.A.*, 307, Feb., 1945.
28. VAN ALYEA, O. E.: Irrigation of Maxillary Sinus by Way of the Middle Meatus. *Ann. Otol., Rhinol. and Laryngol.*, 298, June, 1945.
29. KUPFER, EL.: Low-Voltage Galvanization in Sinusitis. *Jour. Laryngol. and Otol.*, 68, Feb., 1945.
30. SHAMBAUGH, G. E.: Nasal Allergy for the Practicing Rhinologist. *Ann. Otol., Rhinol. and Laryngol.*, 43, Mar., 1945.
31. PARKINSON, S. N.: A Discussion and Criticism of Determination of Intranasal Ph. *Arch. Otolaryngol.*, 68, Jan., 1945.
32. Annotation: *Lancet*, 408, Mar., 1945.
33. Correspondence: Hazards of Tonsillectomy and Adenoidectomy. *Jour. A.M.A.*, 740, Mar., 1945.
34. Correspondence: X-ray of Thymus Prior to Tonsillectomy. *Jour. A.M.A.*, 1068, Dec., 1945.
35. SINGER, R.: Acetylsalicylic Acid, a Probable Cause for Secondary Post-tonsillectomy Hemorrhage. *Arch. Otolaryngol.*, 19, July, 1945.
36. NEIVERT, H.: Late Secondary Tonsillar Hemorrhage: No. 1, Studies of Prothrombin and Vitamin K. *Arch. Otolaryngol.*, 14, July, 1945; summary from *Jour. A.M.A.*, 575, Oct., 1945.
37. VOLLUM, R. L., and WILSON, G. S.: Sulfonamide Lozenges for Streptococcal Carriers. *Brit. Med. Jour.*, 545, Apr., 1945.
38. SCHWARTZ, BERNARD M.: Effectiveness of Penicillin in the Treatment of Vincent's Angina. *Jour. A.M.A.*, 704, July, 1945.
39. SHALLENBERGER, PAUL L.; DENNY, EARL D., and PYLE, HAROLD D.: The Use of Penicillin in Vincent's Angina. *Jour. A.M.A.*, 706, July, 1945.
40. JOHNSON, WINGATE M.: Nicotinic Acid in Vincent's Angina. *Jour. A.M.A.*, 91, Sept., 1945.
41. MALINIAC, J. W.: Fracture Dislocations of the Cartilaginous Nose. *Arch. Otolaryngol.*, 131, Aug., 1945.
42. Section on Otolaryngology, Royal Society of Medicine: Causes of Failure in the Surgical Treatment of Chronic Frontal Sinusitis. *Jour. Laryngol. and Otol.*, 31, Jan., 1945.
43. GOODALE, R. L.: The Use of Tantalum in Radical Frontal Sinus Surgery. *Ann. Otol., Rhinol. and Laryngol.*, 757, Dec., 1945.
44. RUDDY, L. W.: A Transpalatine Operation for Congenital Atresia of the Choanae in the Small Child or the Infant. *Arch. Otolaryngol.*, 432, June, 1945.

45. BOYD, H. M. E.: Description of Techniques Used in Meeting the Operative Difficulties in Congenital Atresia of the Posterior Nares. *Arch. Otolaryngol.*, 261, Apr., 1945.
  46. WOODRUFF, G. H.: Ossifying Fibroma of the Ethmoid Cells and the Frontal Sinus. *Ann. Otol., Rhinol. and Laryngol.*, 582, Sept., 1945.
  47. BERNFELD, K.: The Genesis of Typical and Atypical Cysts of the Nasal Floor. *Jour. Laryngol and Otol.*, 145, Apr., 1945.
  48. WISHART, D. E. STAUNTON: Diagnosis and Treatment of Sinusitis in Children. *THE LARYNGOSCOPE*, 97, Mar., 1944.
- 

#### GEORGE A. BREON COMPANY FELLOWSHIP.

Among the fellowships being granted or continued by member firms of the American Pharmaceutical Manufacturers' Association is the George A. Breon Company Fellowship at the University of Missouri.

This three-year-old fellowship in the organic chemistry department is being continued another year to further study the synthesis of hydrogenated diethylstilbestrol compounds, having as its objective the extension of the clinical application of diethylstilbestrol. The work is being carried on under the direction of Dr. Herbert Ungnade, assistant professor of organic chemistry, University of Missouri, one of the chemists who has achieved special recognition for successful work in the synthesis of vitamin E.

A report made earlier this year to the American Pharmaceutical Manufacturers' Association by its general counsel, Charles Wesley Dunn, stated that representative manufacturers in the pharmaceutical industry spent 5.5 per cent of their sales on scientific research. In addition, a plan is now under way whereby the American Pharmaceutical Manufacturers' Association will sponsor a scientific research program which will be supported by association funds.

BENJAMIN GUY BABINGTON —  
INVENTOR OF THE LARYNGOSCOPE.\*

WALTER A. WELLS, M.D.,  
Washington, D. C.

Before the perfection of the new method of examining the larynx by direct illumination and inspection, laryngoscopy meant only one thing — the examination by means of viewing the reflected image in the mirror.

In order to distinguish one from the other, it has become a habit to speak of the former or older method as indirect and the newer as direct laryngoscopy.

This paper is concerned with the story of the invention of the old or the indirect method. The perfection of the new or direct method has had the effect of throwing the importance of the older somewhat in the shade, but the importance of an invention should rightly be judged not by comparison with what has come after it, but rather in comparison with what went before it. It must be remembered that before the days of the laryngoscope the larynx was for all intents and purposes an internal organ. Hidden from view, we had to depend entirely upon subjective symptoms for diagnosis of any morbid process by which it might be affected. The introduction of laryngoscopy of any kind constituted, therefore, a revolutionary advance. It really marked the beginning of the science of laryngology.

It is apropos that we recall in this connection a spectacular international celebration held about 40 years ago. On March 17, 1905, a little before noon, there was assembled in the auditorium at the home of the Royal Medical and Chirurgical Society of London, located at Hanover Square, a very distinguished company. They were men and women from the high-

---

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, June 12, 1946.

\*Read at the Meeting of the Southern Section of the American Laryngological, Rhinological and Otological Society, Inc., Richmond, Va., Jan. 7, 1946.

est walks of life — the most cultured, the most artistic and the most learned. Many of them had come from great distances to be present on this occasion — from countries as far apart as the Americas and Japan. Some were there as delegates from great universities; some as deputies from scientific societies; some as direct appointees of their governments, and some as direct personal representatives of their sovereigns.

The room on all sides was profusely decorated with palms and other luxurious growing plants. At the upper end of this room, upon the center of a heavily carpeted dais, was seen a vacant high-backed chair, richly upholstered in crimson. At each side and in front of the chair were magnificent bouquets, bearing complimentary inscriptions — obviously floral tributes in honor of a special guest.

Back of the stage was a life-size portrait, still veiled, but its identity not unknown to the audience. At exactly noon, all eyes were directed to a venerable figure approaching from the side, and as he mounted the platform and took his seat in the appointed chair, he was greeted with enthusiastic applause. Upon his breast he wore the insignia of the Royal Victorian Order; and though a very aged man, he walked alone, had an erect bearing and seemed vigorous and alert. The man was Manuel Garcia, who was this day celebrating his one hundredth birthday, and who was being honored as the inventor of the laryngoscope. By a strange coincidence it was also the fiftieth anniversary of the year in which he announced the invention. He came to this meeting direct from Buckingham Palace, where as was stated by Sir Felix Semon, physician extraordinary to the King, he had had conferred upon him the Royal Victorian Order.

The Marquis of Villalobar announced that he had been instructed by his King to confer upon Garcia the Royal Order of Alphonse XII; and Dr. Fränkel, of Germany, announced that he was there in the name of his Emperor to confer upon Senor Garcia the Great Gold Medal for Science, an honor that up to this time only four men of science had been regarded as worthy to receive: Virchow, Koch, Ehrlich and Mommsen.

Dr. Harmon Smith, a member of the American Laryngological, Rhinological and Otological Society, Inc., was present as representative of the laryngologists of America, and as such presented to Senor Garcia the painting which stood beside him — a life-sized portrait by the famous artist, Sargent.

It all made a beautiful scene — the kind it does the heart good to dwell upon, and that it seems a pity to have in any way marred; but if someone should be prompted to ask the familiar question, "What is wrong with this picture?" the answer would be, "Everything is wrong; they were honoring the wrong man." No one can be rightfully called the inventor of something that had previously been invented.

Manuel Garcia, a native of Spain, was the most eminent singing teacher of his day, and taught in London and Paris. His efforts to devise a laryngoscope grew out of the idea that the science of voice production would be greatly advanced if one could see the vocal cords in action. He succeeded in doing this, and he reported his success in a paper presented to the Royal Society of London on May 25, 1855. But a little over 24 years before this, *viz.*, on March 18, 1829, Benjamin Guy Babington had described before the Hunterian Society of London an instrument for examining the larynx that was essentially the same instrument. A report of the event is to be found in the *London Medical Gazette* of 1829, Vol. III, p. 555. "Dr. Babington submitted to the Society an ingenious instrument for the examination of the parts within the fauces not admitting of inspection by unaided sight. It consisted of an oblong piece of looking glass set in a silver wire with a long shank. The reflecting part is placed against the palate whilst the tongue is held down by the spatula, when the epiglottis and upper part of the larynx becomes visible in the mirror. A strong light is required and the instrument should be dipped in water, so as to have a film of fluid upon it when used or the halitus of the breath renders it cloudy. The Doctor proposed to call it the 'glottiscope'."

With this explicit description of the Babington instrument, and of its purpose and its method of use, why is it that Garcia

had been universally acclaimed as the inventor of the laryngoscope, and why does medical history go on repeating the

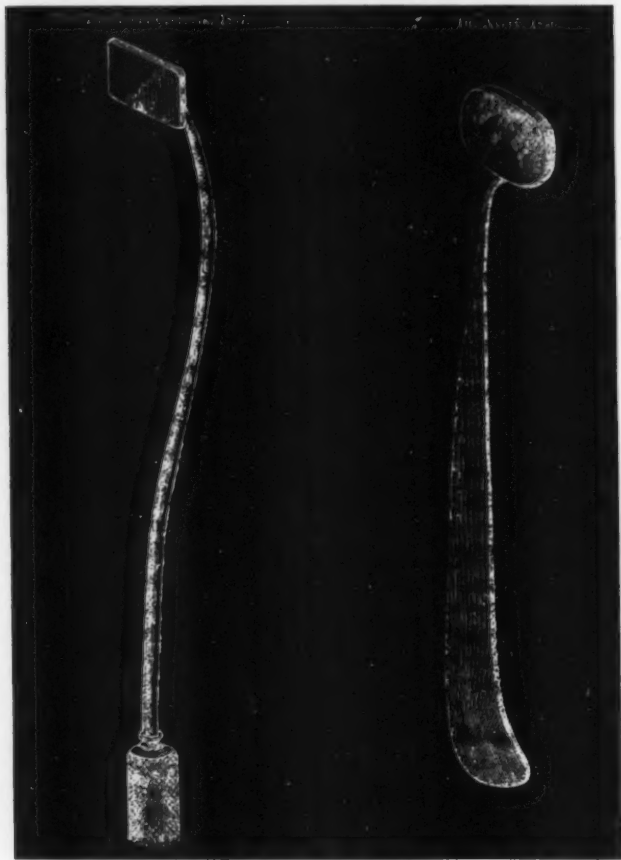


Fig. 1. Laryngoscopic mirrors used by Turck, Czermak and Avery some years after Babington, resembling less than his, the present style.

error? Was his invention perhaps in some way essentially different or in some important aspect superior to that of Babington? The evidence is to the contrary.



Sir Morrell Mackenzie, in a paper before the Royal Medical and Surgical Society, April 26, 1864, gave a complete account of Dr. Babington's invention that should have settled the question for all time, but for some reason this evidence has been overlooked. Dr. Mackenzie on that occasion showed the instruments designed by Babington. They bore the name of the original instrument maker, whose invoice also was produced. In the first model the mirror was affixed to an especially constructed tongue depressor, but a few years later this

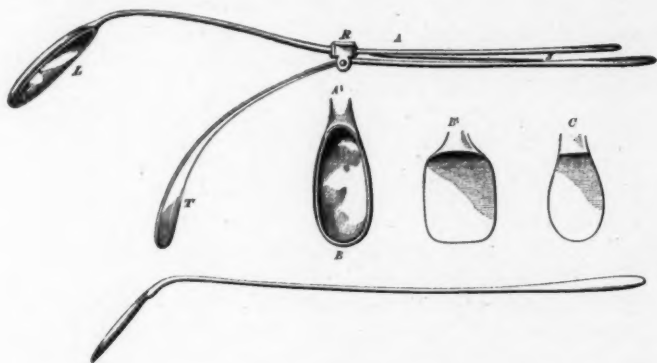


Fig. 2. Dr. Babington's Laryngeal Mirrors (after McKenzie).

Above is the original instrument as described and used by Dr. Babington in 1829.

The mirror is combined with a tongue depressor **T** which worked automatically from a spring **S** when the handles were pressed together.

**A** front view of mirror made in 1829.

**B** side view of mirror made between 1829 and 1835.

**B1** front view of same mirror.

**C** oval mirror made between 1829 and 1835.

part was omitted. You will see from the illustrations that the instrument was very much like that in use today. It is indeed more nearly like it than the one used by Dr. Turck, of Vienna, some 30 years later. The Turck instrument was a copy of the one designed by Garcia.

A claim to inventorship to be perfect requires that the invention be put into practical operation. It may be thought that Babington invented the laryngoscope but never made

practical use of it. This point is also fully covered by the evidence. Mackenzie tells us that the instrument was used by Dr. Babington over a period of several years. Two other laryngologists, Dr. Windsor and Dr. Gibbs, who were present at the meeting, gave testimony to the same effect.

Turck, in the year 1857, borrowed the instrument of Garcia and began using it in hospital cases in the Allgemeines Krankenhaus of Vienna. Czermak, of Budapest, became interested, made some improvements in the instruments, and then traveled over Europe propagandizing the new method of studying diseases of the larynx. A disgraceful quarrel was carried on between these two men as to who deserved the greatest credit. The French Academy of Sciences, being unable to determine the question, divided a medal between them.

Dr. Turck's claims are recognized by a statue which stands in the hospital grounds of the Vienna General Hospital. Dr. Krishaber, who was a disciple of Czermak, wrote a lengthy article on the subject of laryngoscopy, in which he boldly asserts that the birthday of this science should be fixed as March 27, 1858, the date of the publication of the first paper on the subject by Czermak (*Wien med. Wochenschrift*). This claim can no more be allowed than that made for Garcia. The contest between Turck and Czermak was over the credit of applying the laryngoscope to medical uses; but as we have seen, this was what Babington did, so that he anticipated these two as well as Garcia. It now only remains to consider whether he, himself, had been anticipated.

Some previous attempts along the same line have been cited but on investigation they will be seen to have been abortive and unsuccessful. As early as the seventh century, an instrument called the glossotrochus was described by the great Byzantine physician, Paul of Egina. It was nothing more than a polished steel blade used as a tongue depressor and held in place by a horseshoe-shaped attachment fastened under the chin. Its purpose was to provide some illumination of the fauces.

In 1749, Levret, a French obstetrician, published a paper in which he describes a speculum useful for removal of polyps of the nose and throat as well as of the womb. It was an instrument to serve the double purpose of securing the immobility of the tongue and providing better illumination of the oral cavity, and perhaps the nasopharynx, nothing more.

In 1807, Bozzini, of the City of Weimar, created quite a sensation by publishing a description of his "Lichtleiter" or light conductor, an apparatus for facilitating the examination of the body cavities. It consisted of two parallel tubes, one for admitting light, the other to carry a mirror. It would not be possible to see into the larynx with it, and no claim to that effect was ever made.

The nearest to a genuine laryngoscope was an instrument devised by Dr. Senn, of Geneva — reference to which appears in the *Journal de Progres*, Paris, 1829, p. 231 note. This, as it happened, appeared in the same year as that in which Babington's invention was announced but it was a few months later. The number of this issue is undated, but it happens that the article in question is prefaced by a letter dated in August. Nowhere is there to be found any description of the instrument and the inventor himself deliberately states that he gave it up as impractical; however, he was of the opinion that a practical instrument for the purpose was possible of construction.

Babington was thus the first to devise an instrument capable of affording a view of the larynx, and he employed it for clinical purposes. Garcia reinvented a similar instrument, which he successfully used for the observation and study of the vocal cords. It is to be presumed, being a non-medical man, that he was unaware of the previous invention of Babington, since medical men themselves were generally unaware of it. As Garcia used the instrument to examine his own vocal cords, he was probably the first to employ autolaryngoscopy. To Turck and Czernak must be given the credit of convincing the medical profession that the laryngoscope was a valuable addition to the physician's armamentarium.

Benjamin Guy Babington was born in 1794 in Guy's Hospital, where his father was in residence as a member of the staff, a fact which accounted for his middle name. The father, Dr. William Babington, a native of Ireland, was a learned and able man who rose to high prominence as a London practitioner. His daughter married the famous Dr. Richard Bright.

Benjamin entered the Navy at the early age of 15, but after a year or so, gave up a naval career. He studied first



Dr. Benjamin Guy Babington, Inventor of the Laryngoscope.  
(By courtesy of the Royal College of Surgeons, England.)

at Charterhouse, after which he entered Haleybury College, a school established especially to train young men for the East Indian Service. After about 10 years in India, during which time he achieved distinction as an Oriental scholar, he returned to England, on account of his health.

Determining now to take up his father's profession, he pursued the study of medicine at Cambridge University and Guy's Hospital. He received from Cambridge the degree of B.M. in 1825, and M.D. in 1830. He had not yet received his doctor's degree when he reported to the Hunterian Society

on his device for examining the larynx. At Guy's he became interested in the new science of organic chemistry and in the study of the blood and urine. He was of great assistance to his brother-in-law, Dr. Bright, in making laboratory examinations in connection with his study of diseases of the kidneys. He wrote an excellent article on the subject of the blood — "Some Considerations with Respect to the Blood, Founded on One or Two Very Simple Experiments on That Fluid" (*Med. Chir. Transacts.*, 1830, XVI). It was in this article that he gave to the fluid of the blood divested of its corpuscular contents the term which it has ever since retained, "liquor sanguinis."

Of his papers on clinical subjects, especially to be mentioned is one on the subject of chorea, in which he makes note of the beneficial effect of arsenic in that disease; and an article on cholera, in which he called attention for the first time to an erythema which is occasionally seen in that disease. One of Babington's colleagues on the staff at Guy's Hospital was Dr. Thomas Hodgkins, the father of Hodgkins' disease.

When a vacancy for the position of Assistant Physician at Guy's occurred, the competition to fill the position was very great. The two most prominent candidates were Babington and Hodgkins. Hodgkins was a Quaker and a rather eccentric man, but his work on pathology had won him a European reputation, and it was generally expected he would get the position. When the plum fell to Babington, Hodgkins was so chagrined that he gave up medicine as a career and took up strange hobbies — one of which was to join in a movement for improving the lot of the Palestine Jews. He died while on a journey to Palestine undertaken in the interest of this cause.

It is a coincidence that the only contemporary notice of Babington's invention was made in one of Hodgkins' lectures at Guy's Hospital in which he referred to the "ingenious invention of my friend, Dr. Babington, a speculum laryngis or the laryngoscope" — thus baptizing it with the name it has ever since borne.

Dr. Babington eventually became a full physician on the staff at Guy's — and thus an associate of two other men who,

like Dr. Hodgkins, won great eponymic fame — Dr. Addison, of Addison's disease, and Dr. Bright, of Bright's disease.

Dr. Babington was a man of extraordinary versatility and he excelled in everything he undertook. Before he took up medicine he had already attained distinction for his profound knowledge of Sanscrit. He deciphered obscure inscriptions and documents written in that language which, in the words of a contemporary, "had long baffled the ingenuity of the greatest Oriental scholars."

He made a special study of the Tamul dialect, and before the age of 20 he translated from Latin into English the manuscript of a Tamul grammar and he translated certain curious folklore stories written in that language. One was entitled, "The Adventures of Gooro Paramarton." It is an account of the amusing adventures of a high dignitary of the Brahmans and his five disciples. This little book was reprinted with illustration in 1865, and again quite recently by the Rowan Club, of Cleveland, Ohio, for those specially interested in this subject.

During his connection with Guy's Hospital, Babington was busily occupied with research, clinical work and teaching. Then, strangely enough after 25 years of such work he gave up his connection with the hospital to enter a different field of work; namely, epidemiology. He was a prime mover in organizing a new society, the Epidemiological Society, which was solely concerned with this subject; he became its first president in 1850, and was continuously elected to succeed himself until the year 1864, when he insisted upon the office being turned over to another. This Society cooperated effectively with government authorities and did much to awaken public interest in a subject that until then had been sadly neglected.

Babington's presidential addresses were masterful expositions of public health problems and could be read with profit even today. Sir Thomas Watson said, "His name will ever live as a founder, and for many years in succession, the president of a Society which has for its ends the elucidation of one of the most interesting, important and obscure subjects



of medical inquiry — the sources and laws of epidemic disease." It is worth mentioning that in certain of his addresses Babington braved hostile public opinion in his advocacy of measures to control the spread of diseases of venereal origin among the civil population. The devotees of public hygiene or state medicine might with almost as good reason as laryngologists take Babington as their patron saint. Incidentally, everyone who has read Hecker's "Epidemics of the Middle Ages" in England is indebted to Babington for the excellent English translation of this classic from the German.

There is still another side to the life of this versatile man which should be mentioned. Along with his scientific pursuits, he was an admirer and lover of the fine arts, and is said to have possessed considerable talent in painting and sculpturing. Sir Thomas Watson said of him, "Excelling in those things which require perfection of the senses, accuracy of the eye, agility of limb, delicacy of touch, he was in the sportsman's phrase, 'a good shot, a skillful billiard player and no mean modeler'." He was the author of some poems, which are said to express a high degree of graceful thought and sentiment.

It was in 1855, you remember, that Garcia presented his paper to the Royal Society announcing the invention. It was in this very year that Babington published a small volume entitled, "Passing Thoughts in Sonnet Stanzas." Included with his original poems was a number of others, translated from the German, French, Italian and Spanish.

Whether or not Babington was cognizant of Garcia's claims, we do not know. It might well have been so, because he was himself a member of the Royal Society — in fact, for a while a member of the Council — and we find that in the year 1859 he contributed a paper on some subject in physics. That he did not protest and assert the priority of his own claim is, however, in keeping with his character. He was ever a modest and an unassuming person, who cared more for the advancement of science than for his own celebrity.

As to his character, we will do best to quote the estimate of one who could speak from a personal acquaintanceship —

"He was personally universally beloved, and a more amiable and genial temper than he possessed is not to be found. He was overflowing with fun and good humor — cheerful, gay and sprightly — and with it all, benevolent to a fault."

He was certainly a man possessed of great talent, of an extraordinarily productive mind, which he devoted at different stages of his life to widely varying subjects. One cannot but wonder to what heights he might have risen if all his energies had been confined to a single field. As we have seen, he left his mark wherever he worked.

In his youth he became a noted Oriental scholar, and very recent reproductions of certain of his works have given a permanence to his early reputation in this field. From the classics he turned to science, and he made many worthwhile contributions in geology and the physical sciences. On entering medicine he became a pioneer in organic chemistry and hematology, and he introduced terms in the latter science that are still in use today. At the same time he was busy in devising ingenious mechanical contrivances and as we have proved he was the first to invent the laryngoscope and the first to use it in medical practice.

In Babington's collection of sonnets there is one addressed "To My Friend and Physician." The noble sentiment might well be applied to the author himself:

TO MY FRIEND AND PHYSICIAN.

Some in the Senate strive their name to raise,  
Some thirst for glory in the tented field,  
Some holy weapons in the pulpit wield,  
Some grace their temples with immortal bays.  
That man of wisdom who devotes his days  
To cure those thousand ills in flesh revealed,  
To none of this ambitious crew shall yield,  
Howe'er secluded he from vulgar praise.

And thee, my kind adviser, still the same  
Good friend and guide in sickness or in health  
(Ensampler of the Good Physician thou),  
How shall I ever thank enough, or how  
Requite? Accept this prayer — may peace and wealth  
Be thine on earth — hereafter bliss and fame.

## ROUND SHADOWS IN THE MAXILLARY SINUSES.\*

R. WESLEY WRIGHT, M.D.,  
Palo Alto, Calif.

During the past three years a considerable number of round shadows have been seen in the maxillary sinus on X-ray. Many have been investigated at surgery and by microscopic section. The X-ray examinations were made for many reasons: some routine, some because of a history of past infection and some while searching for a focus of infection. A great many interesting problems arise as to the nature and clinical significance of these cystic or polyp-like structures. Among these problems are the questions of their symptomatology, the possibility of acting as a focus of infection, the mechanism of production and many others. These are the questions which the rhinologist would like answered when he examines an X-ray showing one or more round shadows in the maxillary sinus.

Some of these problems will be discussed here insofar as any light is thrown on them by the 78 cases presented. This paper has been called "Round Shadows in the Maxillary Sinuses" because the means of detection is usually by X-ray and because no uniform pathological entity is represented by such a finding.

Classification of maxillary cysts: Lindsay,<sup>1</sup> in a recent article entitled, "Non-Secreting Cysts of the Maxillary Sinus Mucosa," classifies the more common type of maxillary cyst as follows:

1. Benign cysts arising from the jaw or teeth:
  - a. Follicular or dentigerous cyst.
  - b. Radicular or dental cyst.
  - c. Median anterior maxillary cyst.

\*Candidate's Thesis for American Laryngological, Rhinological and Otolological Society, Inc.

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, March 27, 1946.

2. Benign cysts arising from the sinus mucosa:

- a. Secreting cysts, including gland cysts and mucocele.
- b. Non-secreting cysts of the sinus mucosa.

This classification seems a very good one as it takes into consideration all types of cystic structures found in the maxillary sinus. There is very little general agreement on maxillary cysts in most textbooks and early articles. Many of these writings speak of maxillary cysts and go on to describe only cysts of dental origin.

Only benign tumors arising from the sinus mucosa will be discussed in this paper. (Not many dentigerous or radicular cysts have been seen here.)

Clinically, based on gross appearance, these structures seem to fall into three classes. These gross appearances will be described below, and the cases seen here will be classed according to this description.

1. *The Non-Secreting Cyst* (McGregor<sup>2</sup> calls these mesothelial cysts): This is a thin-walled structure of varying size found in the maxillary sinus. At operation it appears as a very thin membranous sac filled with clear orange colored fluid. There is little gross structure to the wall. Fine blood vessels usually fan out over the thin surface. The cyst is very easily ruptured by any manipulation and collapses like an empty balloon with the discharge of orange colored fluid. In the cases seen here these cysts were found attached in any location, but most often on the floor of the sinus by a rather wide base, being free on all other aspects. They are removed intact with some difficulty and when so removed are rather difficult to fix and section as such. The remainder of the sinus mucosa is most often found to be normal but may be cystic or polypoid.

2. *The Polyp-like Structure*: These are best described by their similarity to the nasal polyp. They are thin-walled myxomatous structures, usually smaller than the average non-secreting cyst, and differ from it in that they can be removed intact easily as they have no tendency to rupture or the contents to extrude. Those reported here were attached to the roof of the antrum except in one instance. The base of the

attachment is narrow, with the polyp free on all other aspects. The remaining membrane is usually normal.

3. *Secreting Cysts*: These are pale structures usually of rather small size with a thick wall. These were not movable as the cyst and the polyp are, but were attached by a very wide base. When punctured they are found to contain a thick, pale mucus material. They can be removed intact with a considerable amount of basal mucosa.

Of 78 cases showing round shadows in the antrum on X-ray here, 42 have been operated. The pathological structures in these 42 operated cases were classed as follows:

1. Non-secreting cyst found alone with no other membrane changes.  
Nineteen cases. Four of these cases were bilateral.
2. Multiple non-secreting cysts in the same antrum.  
Nine cases.
3. Non-secreting cyst with the remaining mucosa containing a mucus cyst or polypoid membrane.  
Seven cases.
4. Polyp. The remaining membrane was normal.  
Six cases. Two of these were bilateral.
5. Secreting or mucus cyst only.  
Three cases.
6. Polypoid membrane only. No real polyp or cyst found.  
One case.
7. Nothing found at surgery. Round shadow seen at X-ray some time previously not found at surgery. Membrane was normal.  
One case.
8. Atypical cysts.  
Two cases.

*Frequency*: The finding of a round shadow in the antrum is not an uncommon one. It is, however, fairly difficult to tell in what proportion of the population it would be found. Here at the aviation processing center well over 100,000 men have been examined for pilot training. The examination is rather thorough. Any candidate who gives a history of sinusitis

or who shows any trace of sinusitis or allergic findings is X-rayed. Of this number, about 57 cases showing round shadows have been detected by Roentgen examination. These men were sent to the nose and throat department for removal or evaluation. Some were lost sight of and are not included in the discussion. Obviously many cysts have passed without detection, because very often they are entirely dormant, with no history or findings leading to their discovery.

In our files of clinical histories and X-rays, including all personnel and dependents, there are 1,683 X-ray reports. In this number there are 89 reports which state that a round shadow or round shadows are present in one antrum or both antra. This represents in round numbers 5 per cent of the total. These X-rays were taken for any of the numerous reasons for which films are made in a nose and throat practice. Many were for routine check during physical examination, some for known sinusitis, others during a search for focus of infection, etc. These cases were taken from the entire field and do not necessarily belong in the group examined for pilot training previously mentioned.

Hardy<sup>3</sup> states that cysts are not frequently encountered and at times are discovered only on routine examination. McGregor<sup>2</sup> says that at the Manhattan Eye and Ear Infirmary cysts were very frequently found in the maxillary sinus on X-ray examination. He states that the great frequency with which the X-ray demonstrated cysts first interested him in the problem. Lindsay<sup>1</sup> believes that cysts are common in the maxillary sinus. Straus,<sup>4</sup> in a recent article, states that the antrum cyst constitutes a common but sometimes obscure cause of headache. He believes mucosal cysts are relatively common and reports 25 cases seen in 10 months. James<sup>5</sup> states, "It is not an unusual occurrence to find growths within the nasal sinuses . . ."

*Symptomatology:* The following is a tabulation of the cases observed here. The symptoms which were responsible for the X-ray examination leading to the discovery are given, also the symptoms which might be attributed to the cyst or co-existed with it. Treatment and results are also given in brief.



TABLE 1.

Symptoms, occurrence leading to the discovery of the cyst, relation thought to exist between symptoms and pathology, treatment in brief and results of treatment.

Case		
1 R. A.	No symptoms before surgery. Found on routine examination.	No complaints following. Removed for aviation.
2 H. A.	No recent symptoms. Found because of past history.	Clinically well following surgery. Removed for aviation.
3 H. B.	Headache following head injury. No nasal symptoms. Nervousness and fatigue.	No surgery. Symptoms considered post-traumatic and psychoneurotic.
4 A. B.	Sinusitis and aero-otitis.	No surgery. Chronic sinusitis cleared to normal by treatment.
5 R. B.	Left frontal headache following cold.	No surgery. Cyst was on the opposite side. Cyst was asymptomatic X-ray finding only.
6 I. B.	Occipital headaches. Pain in left face following cold.	No surgery as cyst was on the opposite (right) side. Recovery from symptoms after several months.
7 E. B.	Right antral sinusitis following nasopharyngitis. No symptoms from left side.	No surgery other than washing on right side. Cleared up. Mucus cyst removed from left for aviation reasons.
8 D. B.	Low grade fever following nasopharyngitis. Nose and throat asymptomatic at time of examination.	Right antrum opened for cyst removal. Cyst had disappeared. No change in fever. Other sinuses were clear.
9 W. B.	Sinusitis following atypical pneumonia. Polypoid tissue found in right middle meatus.	Cysts, bilateral, removed primarily for aviation reasons. Sinusitis had cleared somewhat. Some purulence following surgery.
10 B. B.	Some postnasal discharge. Admitted but no complaints.	Bilateral cysts removed for aviation reasons. No postoperative complaints.
11 H. B.	No symptoms complained of. Nasal discharge seen at examination for flying.	Cyst removed from the left antrum for aviation reasons. No postoperative complaints.
12 R. B.	Nasal allergy. Sneezing, itching, watering discharge. Only bacterial allergy found.	Non-secreting cyst removed from left antrum because of possibility of focus. No relief.
13 R. C. B.	Rather severe persistent aerosinusitis, mostly on the right side. Some numbness over face after descent. Some discharge and stuffiness at all times.	Cysts and thickened membrane removed from right antrum for aviation reasons mainly. No postoperative complaints.
14 P. C.	Aerosinusitis on many occasions. No other symptoms.	No cyst surgery. Submucous resection seemed to alleviate aerosinusitis.
15 K. C.	Chronic otitis media, right. No nasal symptoms or other symptoms.	No surgery or antral treatment as there were no symptoms or findings.
16 W. C.	Aerosinusitis, left side. Chronic sinusitis, left antrum.	Left radical antrum after many irrigations without relief from purulence. Antral polyps removed. Good postoperative result.

(Continued)

TABLE 1 (Continued).

Case		
17 R. D.	No recent symptoms. Cyst found because of past history of sinusitis.	Right antrum cyst removed for aviation reasons. He had had no complaints flying as a gunner, but cadet training demanded its removal. No postoperative complaints.
18 A. E.	Acute sinusitis, right antrum and left frontal.	No surgery as the cyst found was in the unaffected left antrum.
19 W. G.	Postnasal discharge from right side. No other complaints.	Right antral cyst was not removed. Right antrum was clear on irrigations. No definite follow-up.
20 C. G.	Frontal and occipital headaches. Headaches were intermittent, irregular, any time of day.	Allergic sensitivity found. Allergic treatment with fairly good results.
21 W. H.	Aero-otitis media. Sinusitis, left antrum.	No removal of right cyst or polyp. Left antral sinusitis cleared on washing. Adenoidectomy relieved aero-otitis recurrences.
22 G. H.	Aero-otitis media. Antral polyps found because of this. No symptoms other than acute cold.	Right antral polyp removed for aviation reasons.
23 B. J.	Headaches in frontal and temporal regions. Several years. Made worse by flying in general. Nervousness.	Large right antral cyst not removed as a psychoneurosis seemed to better explain all symptoms.
24 J. J.	Headache for three years directly following automobile accident.	Antral cyst considered incidental finding.
25 F. K.	Aerosinusitis. Some cold.	Antral cysts not removed as acute condition cleared on treatment and time.
26 G. K.	Cold and sinusitis two months.	With treatment opacity of each antrum cleared. Antral polyp on the left was removed for aviation reasons. No postoperative complaints.
27 G. Kl.	Sinusitis, right antrum, headache and purulent discharge.	Right antral cyst and purulent membrane removed with good results.
28 W. K.	Aerosinusitis. Slight cold.	Cyst on opposite side to symptoms of aerosinusitis, but removed for aviation reasons.
29 N. K.	Nasal stuffiness and nasal allergy. Fourteen years.	Many sensitivities found. No surgery thought necessary. Allergic treatment.
30 J. K.	Acute bilateral otitis media. No sinus symptoms other than acute upper respiratory infection.	Antral cyst removed for aviation reasons.
31 V. L.	Bronchitis. Cyst found on routine X-ray. No nasal or general symptoms other than bronchitis.	No sinus treatment. Cyst considered as incidental finding.
32 R. L.	Acute right frontal headache following acute cold.	Sinusitis cleared by washing. Cyst removed for aviation reasons. No postoperative complaints.

(Continued)

TABLE 1 (Continued).

Case		
33 G. L.	Aero-otitis media with purulent otitis media following. Round shadows discovered by routine X-ray.	Antral polyps removed for aviation reasons. No postoperative complaints.
34 R. Lo.	Posterior headache, extreme nervousness, ear stuffiness.	No antral treatment was done as a definite psychoneurosis adequately accounted for the symptoms.
35 A. Mc.	Nasal stuffiness. Many months. Some joint pains.	Definite nasal allergy found, though slight. Good results from treatment.
36 C. Mc.	Nasal stuffiness, right side. Pressure feeling in right side of face. Some numbness of the right face intermittently.	Right antrum cyst removed with good results. No postoperative complaint.
37 O. Mc.	Headache of several years' duration. Mostly left frontal.	Cyst removal advised but not done. No good follow-up.
38 S. M.	Headache since the age of 10. Frontal regions to occiput. Sometimes half headache.	Cyst from left antrum removed. Aviation purposes. No relief from headache.
39 F. M.	Nasal polyposis. No sinusitis complained of. Some recent cold.	No surgery for left cyst. Drained by puncture.
40 A. M.	Chronic left sinusitis. Headache in the frontal regions. Swelling over $L_4$ and $L_5$ .	Left radical antrum and removal of cyst. Relief of purulence but not headaches.
41 E. M.	Bilateral catarrhal otitis media. Some nasal discharge seen. No sinus symptoms.	After many washings sinuses became clear except for slight haze where round shadow was.
42 P. M.	Intermittent attacks of pain and pressure in left face and teeth. Some spread to left frontal region.	Left antrum cyst removed. Relief of pressure feeling. Still complained of some headache in frontal region.
43 W. M.	Postnasal discharge. Nervousness and fatigue marked.	The cysts seemed to bear no relationship to the symptoms and so were not removed.
44 R. M.	Round shadow detected on routine entrance examination.	Cyst removed from right antrum for aviation reasons.
45 D. M.	Pain and pressure in the right upper jaw one week. Similar past trouble.	Cannula decompression through natural opening relieved symptoms. Clear orange fluid drained out.
46 R. N.	Bilateral frontal headache when in bright light or on using his eyes.	No treatment. Considered an eye case.
47 L. N.	Dizziness, several months, mild; severe for several days.	Cyst removed because of possibility of focus of infection. Poor results, dizziness to a mild degree continued.
48 M. P.	Generalized headache one year. Accentuated on the right side. Started in South Pacific.	Right antrum cyst removed. Other sinuses were clear. No relief from headache.
49 G. P.	Aero-otitis media. Slight cold.	All symptoms cleared. No surgery.
50 R. P.	Round shadow found on examination for flying. Some cold.	No surgery done as the cyst was asymptomatic. No disposition known.

(Continued)

TABLE 1 (Continued).

Case		
51 S. P.	Swollen lip and left side of face.	Abscessed left upper tooth found to be the cause. Cleared well by dental treatment. Cyst was in left antrum.
52 E. P.	Deviation of nasal septum. X-rays revealed incidental finding of antral cyst.	Cyst removed for aviation reasons.
53 A. P.	Headaches in frontal and occipital regions.	Psychoneurosis thought to be more likely cause than cysts in antrum.
54 W. P.	Round shadow found on routine entrance examination because of past history.	Cyst removed for aviation reasons.
55 J. R.	Frontal and occipital headaches. Two years.	Right antral cyst removed. No relief from headache.
56 L. R.	Headaches in frontal and temporal. No relationship to respiratory infection. No sinusitis.	Psychiatrist believes headache is functional.
57 J. R.	Headache for 10 months. Came on during the night.	Was hospitalized last month for marked psychoneurosis. Symptoms adequately explained on this basis.
58 F. S.	Dull headache and nasal stuffiness on the left side for six months. Intermittent numbness in left upper tooth.	Cyst removed from left antrum. Very little seen following surgery, but no complaints.
59 F. Sh.	Nasal obstruction. Aero-sinusitis.	Allergic rhinitis found. Allergic treatment.
60 M. L. S.	Numbness and tenderness in the left face. Upper teeth on the left somewhat numb. All intermittent. Occasional symptoms on the right side.	Symptoms abated; no surgery. Follow-up later states that symptoms returned.
61 P. S.	Routine check-up during course of acute nasopharyngitis disclosed large round shadow. No nasal symptoms other than acute cold	Left antrum cyst removed for aviation reasons.
62 W. S.	Deafness, right ear. No nasal symptoms other than some postnasal discharge. No general symptoms.	Bilateral antral cysts removed. No definite relief from deafness, which was conductive in type.
63 H. S.	Postnasal discharge, bilateral, heavy material. No headache or general symptoms.	Bilateral cysts removed. Postnasal discharge improved.
64 L. S.	Choriditis, right eye.	Small polyp or cyst at floor of right antrum, not considered the most likely source of infection. Some teeth were extracted. Clearing.
65 P. S.	Aerosinusitis, pain in right forehead, hemorrhagic discharge.	After considerable treatment and time, all symptoms cleared. Left antral polyp then removed for aviation reasons.
66 B. S.	Pain and fullness in right face, several days. Some discharge and fever.	Decompression through natural opening of several cc. of cystic fluid and some pus; relieved markedly. No further trouble.

(Continued)

TABLE 1 (Continued).

Case		
67 D. S.	Subacute sinusitis, left. Antrum mainly.	Sinusitis cleared on treatment, cyst then removed for aviation reasons.
68 R. S.	Sinusitis of several months' duration. Stuffiness.	Cyst removed from the left antrum for aviation reasons. No postoperative complaints.
69 L. St.	Cyst found on routine X-ray. No symptoms.	Removed for aviation reasons.
70 J. S.	Afternoon fever of 100 for one week. Some frontal headache.	The cyst or polyp at the floor of the left antrum was not removed as it was considered an unlikely source of the fever.
71 M. S.	Aerosinusitis, hematoma, in right frontal. "Continuous cold."	Cyst in right antrum removed for aviation reasons following clearing of sinusitis.
72 C. S.	Intermittent attacks of sudden nasal discharge for eight years. Pressure build-up precedes it. In frontal region, usually left.	Left frontal sinusitis probably responsible for symptoms. Cyst in both antra not removed.
73 L. T.	Cyst found in the right antrum because of past history of its existence. No symptoms either general or local from it.	Cyst removed for aviation reasons.
74 G. W.	Recent cold. X-rays taken because of this. No chronic sinusitis or other nasal or general complaints.	Bilateral antral polyps removed for aviation reasons.
75 J. W.	Round shadow detected at entrance examination. Some stuffiness on the right side with each cold.	Mucus cyst removed mainly for aviation reasons but patient improved by surgery.
76 J. We.	Pain and soreness in face and upper right teeth. Some numbness of the face.	Cyst removed from right antrum for relief of symptoms and aviation reasons. Good result.
77 C. Y.	Recurrent attacks of left face soreness and pain which were relieved by puncture of the antral cyst with relief of pressure.	Cyst removed for relief of symptoms. Good result.
78 M. Z.	Chronic sinusitis. Pain in his back and shoulders. Occipital headache. Before the onset of sinusitis he was symptom-free.	Left antrum cyst removed for relief of symptoms with indefinite results.

(The numbers in Table 2 correspond. Table 2 gives gross and microscopic findings.)

In discussing the symptoms arising from antral cysts, I believe it will be best to divide them into several groups for clarity and convenience: 1. Those arising directly from the cyst; 2. those arising indirectly from the cyst; 3. cysts producing no symptoms.

1. Symptoms arising directly from a cyst: In this series of 78 cases of antral cysts there were nine cases which could be classed under this heading. In these cases (see Table 1, Cases 13, 36, 42, 45, 58, 60, 66, 76 and 77) there was pain and soreness in the face, pain in the teeth, and in one, numbness of the upper lip. In both, the discomfort was relieved immediately on decompression of the cyst by puncture. These symptoms are most probably due to pressure from complete filling of the antrum. The cysts were found to fill the antra at surgery. Surgery produced good results in these cases.

Lindsay<sup>1</sup> states that local symptoms pointing to the antrum or to the sinuses are often absent or indefinite. Hardy<sup>3</sup> believes that if the cyst is small no symptoms may be present. Straus<sup>4</sup> states that the cysts rarely if ever cause bulging of the bone of the sinus. He goes on to state that the manner by which a small cyst causes pain is in doubt but may be due to tension or pressure of the mucoperiosteum. Where complete filling of the antrum cavity has been reached, he believes the cause of the pain is pressure. He mentions aching of the upper teeth and pressure sensation in the face. McGregor<sup>2</sup> makes only indirect reference to local symptoms. I have seen no case in which a small cyst caused pain and pressure.

2. Under the heading of indirect symptoms arising from the antrum cysts, I have in mind those symptoms mentioned by other writers; namely, joint pains, vague pains and headaches, fatigue, low grade fever, dizziness and any condition suggesting a focus of infection. Under this heading the most interesting symptoms have been reported. Other writers have been most concerned with this aspect of the antrum cyst. McGregor,<sup>2</sup> one of the earliest writers on this subject, states, "It is not known what toxins may be secretly elaborated within their walls and liberated to work their deadly charms either locally or in distant organs of the body. Cysts occur



only in the presence of a pathological process, so that when they are discovered by X-ray examination, as frequently happens, they should be viewed with grave suspicion even if local symptoms are absent, especially if a search is being made for focus of infection." Lindsay<sup>1</sup> believes that the non-secreting cyst may be responsible for marked fatigability, headaches, irritability, low grade fever and, in some instances, pain in the joints and acute arthritis. He states further, "Our clinical experience has been that the non-secreting cyst in the antrum may produce a profound train of symptoms. Symptoms may develop slowly and progress to a point of total inability to carry on the usual occupation." He presents seven cases illustrative of the symptoms enumerated. Straus<sup>4</sup> concerns himself in his paper, "Mucosal Cysts of the Maxillary Sinus," with persistent or intermittent headache which he believes may arise frequently from the antral cyst. He further states that the headache may be unilateral or bilateral and that it may be of a vague nature, the most common being a simple recurrent or persistent frontal headache. He also says that the patients rarely complain of a nasal discharge. In his series, 25 cases were seen, 15 of which were operated. "All of the cases were cleared of their symptoms."

He reports one case illustrative of toxic absorption; that of an optic neuritis which cleared up rapidly after removal of the cyst. He makes no definite claim to the relationship of this pathology to causation in this case. He does not report any case summaries of the 15 cases operated in which relief of symptoms was obtained.

Hardy<sup>3</sup> reports four cases of maxillary cysts, two with symptoms of sore throat and cold, the other two found while searching for foci of infection. These cases were operated, but little mention is made of the outcome except for the statement of uneventful recovery.

James<sup>5</sup> reports a case of reflex epilepsy which was cured by removal of an antral cyst. The report, however, states that transillumination showed the left antrum to be in marked contrast to the right. "The left maxillary sinus, when opened through the canine fossa, revealed a large cyst the size of an

egg, with a few hard, smaller cysts. The sinus walls were denuded of the thickened, swollen membrane and cysts. A mucoid cyst was the report of the pathologist." There was an eight years' follow-up with no symptoms of seizure. This is not the report of a non-secreting cyst with which we are mostly concerned here. Transillumination, character of the sinus membrane and pathologic report would show it to be more typical of a secreting cyst.

In the series of 78 cases seen here, there were very few cases exhibiting symptoms discussed under this heading whose antral cyst or polyp seemed to bear an etiologic relationship to these complained of symptoms. There was only one case complaining of or admitting to arthralgia. This cyst was removed with indefinite results (see Table 1, Case 78).

There were two cases seen because of low grade fever (see Table 1, Cases 8 and 70). One was operated, only to find that the round shadow, seen at X-ray several days previously, had disappeared; the fever remained unchanged. In the other case the cyst did not seem to offer the explanation.

Headache was an admitting complaint in many cases. (Under headache I do not include the cases having face pain and pressure already mentioned above under local symptoms.) In many of the cases (see Table 1, Cases 5, 13, 18, 32, 65 and 71) the headache was caused by a sinusitis or aerosinusitis which was acute and disappeared on conservative treatment. In one case (see Table 1, Case 24) the headache directly followed trauma. In one case (see Table 1, Case 20) allergic rhinitis was present and the headache was relieved by its control. In several cases (see Table 1, Cases 3, 23, 34, 53 and 56), seen because of headache and exhibiting an antral cyst or cysts by X-ray, a definite psychoneurosis was established. In most of these cases the headache was vague and bizarre and associated with general symptoms of nervousness and fatigue which will be discussed shortly. Some cases which should properly be placed in this category (see Table 1, Cases 38, 40, 48 and 55) were operated with disappointing results. The surgery in itself was successful, but there was no relief from symptoms.

Nervousness, fatigability, irritability were often admitting complaints which were usually associated with headache as discussed above (see Table 1, Cases 23, 34, 43, 44, 53, 56 and 57). Most of these cases were considered to have adequate explanation of this symptom by a psychoneurosis which was definite and not a diagnosis made by exclusion.

Eyestrain (see Table 1, Case 46) accounted for one case of "headache."

Several cases of antral cysts had associated allergic rhinitis (see Table 1, Cases 12, 20, 29 and 59). In one case only bacterial sensitivities could be demonstrated. Because of the marked symptoms, the allergist, the patient and I decided to remove a large left antrum non-secreting cyst. The operated area healed well and without complaint, but the allergic rhinitis remained unchanged. There was no other demonstrable sinusitis.

A considerable number of cases was seen because of sinusitis; those having acute sinusitis cleared with treatment. Occasionally the cyst was removed following this, if necessary to pass flying regulations. In the cases exhibiting chronic sinusitis, many times the opposite antrum was the purulent one, the cyst lying in a clear antrum (see Table 1, Cases 7, 21 and 28). Several cases of cysts in the purulent antrum were cured of the suppuration by treatment (see Table 1, Cases 19, 25, 26, 68 and 71). Several cases of chronic sinusitis existing with cysts were operated for a number of reasons. Some were associated with chronic membranes (see Table 1, Cases 9, 16, 27, 63 and 78). Most of these cases could not be cleared by irrigations and time.

3. Asymptomatic cysts. Many seen in this series were discovered on routine X-rays or because of a history of transient or past sinusitis and were entirely asymptomatic. This number would be increased if cases were included which presented symptoms not thought to be accounted for by the cyst found. The number of asymptomatic cysts would also be increased if those which existed with sinus symptoms, which cleared by treatment, were included. Also, the cysts removed

for the relief of symptoms with no relief should be included as asymptomatic.

A study of Table 1 will show a considerable number of cysts which, in the last analysis, could be classified as asymptomatic.

*Diagnosis:* In this series of cases the most common growth found in the antrum was the non-secreting cyst. These cysts greatly predominated. By percentage on this basis a round shadow found at X-ray is most likely to be a non-secreting cyst. This is also the finding of other writers.<sup>1,3</sup> On X-ray examination, however, it is impossible to say if the structure is a non-secreting cyst, a secreting cyst or a polyp. The only positive means of identification is at operation and resection. Very few have a spontaneous discharge of the characteristic orange colored, gelatinous fluid of the non-secreting cyst. At puncture this fluid is often obtained, but frequently the needle does not reach or puncture the cyst so that negative findings are not conclusive. As is mentioned under the heading of X-ray appearance, there may not be a round shadow seen, but a complete opacity from surrounding membranous infections is evident. In these cases a subsequent X-ray after clearing may reveal the typical rounded border.

To X-ray, these non-secreting cysts are opaque. They transilluminate very well and so are not found by this means. Mucus cyst and hematmata do not transilluminate, which fact constitutes a diagnostic aid. Mucocoeles may theoretically occur in the antrum, but most writers on the subject state that they have never observed a mucocoele in the maxillary sinus. This condition, then, does not constitute a factor in the differential diagnosis.

*X-ray Appearance:* The X-ray appearance of cysts and polyps are the same.

Typically, the structures throw a discrete and moderately dense shadow on the X-ray plate. There may be an entire opacity, however, which obscures this appearance. In this case there is no difference in appearance to any antral infection producing opacity. Occasionally on repeated X-rays there

is a diminution of the size or a complete disappearance of the shadow.

*Treatment:* The treatment of cysts of the antrum in civilian life depends on the symptoms presented. As shown in the text of this article, many of these cysts reported were asymptomatic entirely. In aviation practice the presence of a cyst is taken as evidence of sinus disease and removal is a necessity for qualification. This has been the practice at this base. This accounts for the high percentage of surgical procedures in these cases. In this series the outstanding observation was the lack of symptoms which, without hesitation, could be attributed to the cysts. I have seen very few of these round shadows disappear on puncture or irrigation. This is, however, a distinct possibility but cannot be depended upon. Experience has shown that the cysts usually refill after rupture. This method of treatment also has its difficulty, inasmuch as the cysts are not always accessible to puncture as they do not lie in the path of any sort of puncture needle. One has two possibilities then: Let the cyst remain, if the symptoms permit; or employ some form of surgery for its removal.

Lindsay<sup>1</sup> operated some of his cases by the radical antrum procedure and some by the simple intranasal antrum window. He found the latter method very satisfactory. Straus<sup>4</sup> considers the Caldwell-Luc procedure the best method, as it produces the least trauma to the unaffected membrane and gives an excellent view of the operative field. He considers a counter-intranasal opening to be advisable with this method, though it may not be necessary where the cysts are small. He omitted the nasal opening in only one of his 15 cases.

Forty-two cases have been operated here. The Caldwell-Luc approach was used in all and this method was found very satisfactory. No maxillary nerve block was used in the majority of cases as it was found unnecessary when removing only that membrane forming the base of the cyst. The remainder of the membrane was usually found to be normal. For this reason in all but a few of the cases no opening into the nose was made. Where a considerable portion of the membrane

was found cystic or polypoid, it was removed completely and a nasal counter-opening was made. Careful hemostasis was obtained before closing the incision, and no difficulty was encountered post-operatively in any of these cases. The merits of this procedure as outlined seem to me to be the slight amount of trauma, the simplicity and excellent exposure obtained and, most important, the unaltered nasal physiology.

*Pathology:* As mentioned earlier, a round shadow seen on a sinus X-ray plate does not represent a uniform pathological entity. The pathological structures seen here grossly at surgery and by microscopic section fell into three quite distinct entities: 1. the non-secreting cyst, 2. the mucus or secreting cyst, and 3. the polyp. Some specimens were not typical and were hard to classify definitely, but these were in the minority.

The following is a description of all the gross and microscopic findings. Each is labeled according to its classification.

TABLE 2. GROSS FINDINGS AND MICROSCOPIC SECTIONS.

*Case 1: R. A.* A large, thin, yellowish cyst was found which appeared to fill the right antrum. It was free on all sides except the floor, where it was attached to a 1 cm. base. A great amount of orange fluid came from the cyst, which ruptured even on gentle manipulation. A small mucus cyst the size of a pea and containing thick mucus was also found on the nasal wall of the antrum. The remaining membrane was normal.

*Microscopic:* The specimen consists of a very thin, delicate membrane covered on one side by respiratory epithelium. There are very few cellular elements present. The stroma is of a loose areolar type. There is only the slight inflammatory reaction accompanying most respiratory epithelium. There is no inner limiting membrane, the inner surface being composed of loose fibrous strands only. There is a section of the small mucus cyst showing two small distended glands (see Section 10)). Non-secreting Cyst and a Mucus Cyst.

*Case 2: H. A.* The left antrum was found to be small, with a thick-walled cyst on the floor. The cyst was pale in appearance and filled with pale mucoid material.

*Microscopic:* The specimen consists of a thin membrane covered on two sides by a low columnar pseudo-stratified epithelium. There are rather sparse cellular elements in the membrane partly because of the thinness. Most of the elements are fibrous tissue strands. Secreting or Mucus Cyst.

*Case 3: H. B.;* no surgery.

*Case 4: A. B.;* no surgery.

*Case 5: R. B.;* no surgery.



*Case 6:* I. B.; no surgery.

*Case 7:* E. B. The left antrum contained a small cyst filled with mucus and not cystic fluid. This mucus cyst was smaller than appeared on X-ray. Remainder of mucosa appeared normal. Secreting Cyst.

Microscopic: No section available.

*Case 8:* D. B. There was no cyst found in the right antrum at operation. All the membrane appeared normal.

Microscopic: No specimen as no cyst was found.

*Case 9:* W. B. In the right antrum two thin-walled cysts were found. One attached medially was quite large, and a smaller one in the region of the natural opening was also found. The two cysts together almost filled the right antrum. The remainder of the mucosa was normal.

In the left antrum a small mucocoele, a moderate rigid non-secreting cyst and polypoid membrane were found. The bases of these cysts composed about half of the antrum membrane. The remaining half was normal.

Microscopic: The small cyst, which appeared clinically to be a mucocoele, is covered by respiratory epithelium, below which is a loose areolar structure throughout filled by collagenous material. More typical of a polyp than a cyst. Another section is of the polypoid membrane. No sections available of typical non-secreting cysts. Non-secreting Cyst, Mucus Cyst, Polypoid Membrane.

*Case 10:* B. B. In the left antrum a large thin-walled cyst was found attached to the lateral wall by a broad pedicle. The cyst filled five-eighths of the antrum cavity; 7 cc. of straw colored fluid were drawn off. Remainder of the membrane was normal.

Microscopic: There are two sections, one from each antrum. The membranous wall is of a delicate nature, covered on one side by respiratory epithelium. The membrane varies in thickness. There are few cellular elements, those present being fibrous tissue cells and round cells. There is no inner limiting membrane.

Another section of the cyst from the opposite antrum shows a much thicker, denser membrane. There are many more cellular elements. In one place there is a covering of epithelium on each side of the membrane. This may be the way the section is cut (see text under pathology). Non-secreting Cysts, Bilateral.

*Case 11:* H. B. A cyst was found attached to the anterior wall and floor. It filled about one-half of the left antrum. The remainder of the mucosa was normal.

Microscopic: No section available. Report of pathologist, however, shows the specimen consists of a thin sac-like membrane. The surface is covered by respiratory epithelium. The stroma is thin and delicate and contains relatively few inflammatory cells. Non-secreting Cyst.

*Case 12:* R. B. In the left antrum there was a very large thin-walled yellow cyst filling the antrum. It was attached anteriorly. On removal of the cyst there was another thin-walled smaller cyst attached to the floor. Still another very small cyst was found which was not so typically non-secreting in character. The remainder of the mucosa, other than the attachments of these cysts, was normal in appearance.

**Microscopic:** One section of a rather large cyst. The wall is comprised of a rather low respiratory epithelium in most places, with a thin, delicate submucous. There are some large capillaries in the submucosa.

The small cyst mentioned is covered by a stratified columnar epithelium. An inner, very fine cuboidal epithelium is present (a mucus cyst). The stroma between epithelial elements is moderately heavy. The interior of the cyst is filled with collagen. Non-secreting Cysts and Secreting Cyst.

*Case 13:* R. C. B. Three rather small thin-walled cysts were found in the right antrum. The cysts were very clear in appearance and not typical of non-secreting cysts, though extremely thin. Origins were from the medial, lateral and superior walls. The remaining membrane was thick and approached the polypoid. It was entirely removed.

**Microscopic:** A small section of polypoid membrane covered by pseudo-stratified, ciliated columnar epithelium. There is a fine areolar tissue throughout the structure, with no free space in the center. There is a small mucocoele within the tissue. There is an inner epithelium lining this smaller structure. No section available of the smaller cysts. Thin-walled Atypical Cysts. Mucus Cyst Inclusion.

*Case 14:* P. C.; no surgery.

*Case 15:* K. C.; no surgery.

*Case 16:* W. C. In the left antrum a polyp the size of an almond was found attached to the medial wall. There was some pus in the cavity. The remaining membrane was thin but was removed entirely because of infection. This was a polyp, not a cyst, and did not rupture.

**Microscopic:** The section is a polyp-like structure which is intact. The covering membrane is only a light band of connective tissue covered by a single layer of epithelium, and in places none at all. The stroma of the structure is a very delicate one, being composed of very loose areolar tissue spaces with a few cellular elements. There are no inflammatory cells. Polyp.

*Case 17:* R. D. A large cyst filling the right antrum was found attached to the lateral inferior wall. Cyst was filled with a gelatinous material. The remaining membrane was normal.

**Microscopic:** No section available. Non-secreting Cyst.

*Case 18:* A. E.; no surgery.

*Case 19:* W. G.; no surgery.

*Case 20:* W. G.; no surgery.

*Case 21:* W. H.; no surgery.

*Case 22:* The right antrum was found to be more than half filled with a rather "rigid" polyp. The polyp was not thin-walled or collapsible and was removed intact. There was no fluid from it. The remainder of the mucosa was normal.

**Microscopic:** The specimen consists of a rather large, intact polypoid structure filled with a collagenous material. The covering epithelium is of the respiratory type. There is no delicate inner structure seen because of the heavy colloid material. There are some round and fibrous tissue

cells throughout. There is some slight evidence of inflammatory reaction. This structure is not at all like a nasal polyp. The deep staining colloid material and the heavier structure make it appear quite different.

Category uncertain. Not a non-secreting cyst as typically seen, and not a typical polyp.

*Case 23:* B. J.; no surgery.

*Case 24:* J. J.; no surgery.

*Case 25:* F. K.; no surgery. Puncture showed thin orange colored fluid.

*Case 26:* G. K. A thin-walled yellow cyst filling about one-half of the left antrum was removed intact.

**Microscopic:** The specimen consists of a thin-walled, intact cyst. The covering epithelium is of the respiratory type and covers the outer surface only. The inner limiting membrane is composed of about five closely compressed layers of connective tissue cells running concentrically around the inside of the cyst. There are no other components of the membrane. Only epithelium and the connective tissue strands. The cyst is filled with a pale staining material. Non-secreting Cyst.

*Case 27:* G. K. A thickened polypoid membrane found throughout the right antrum. A large thin-walled non-secreting cyst filling about one-half of the antrum was found attached to the floor. All the membrane was removed:

**Microscopic:** There is one section of cyst wall covered by a fine epithelium, below which is a thin, delicate stroma. There is another section of polypoid or cystic membrane which is rather heavy membrane covered by pseudo-columnar epithelium. In one part there is a mucus cyst included with its low cuboidal epithelium. Mucus material fills the mucus cyst. Non-secreting Cyst and Polypoid Membrane.

*Case 28:* W. K. The right antrum contained a very thin-walled cyst which ruptured easily on removal. The cyst contained a clear orange colored material.

**Microscopic:** No section is available. Non-secreting Cyst.

*Case 29:* N. K.; no surgery.

*Case 30:* J. K. The left antrum contained no definite polyp as shown by X-ray. Only polypoid membrane was found on the face and floor of the antrum.

**Microscopic:** No section available. Polypoid Membrane Only.

*Case 31:* V. L.; no surgery.

*Case 32:* R. L. The right antrum contained a large thin-walled cyst which contained a clear, yellow fluid. There was a small cyst on the medial wall. The remaining membrane was normal.

**Microscopic:** No good section available. Non-secreting Cyst.

*Case 33:* A polyp was found located on the anterior superior face of the right antrum. The remainder of the mucosa was normal. A polyp was located high in the anterior superior portion of the left antrum. The remainder of sinus membrane was normal.

**Microscopic:** No section of any value available. Polyps, Bilateral.

*Case 34:* R. Lo.; no surgery.

*Case 35:* A. Mc.; no surgery.

*Case 36:* G. Mc. A typical thin-walled right antrum cyst was found. The remaining mucosa was normal.

*Microscopic:* There is one section available. The cyst wall is composed of a small amount of fibrous tissue only, with no epithelium. The fibrous tissue is closely packed together with no areolar tissue. Non-secreting Cyst.

*Case 37:* O. Mc.; no surgery.

*Case 38:* S. M. The left antrum contained a large thin-walled cyst which ruptured easily on manipulation and discharged a clear orange colored fluid. The base was attached to the floor toward the lateral wall and was about 5 mm. in diameter. The remainder of the mucosa was normal.

*Microscopic:* The section is small and is doubled on itself many times. It is a rather thin membrane, but compact and covered on one side by respiratory epithelium. Many bands of connective tissue compose the stroma. These bands run circularly under the epithelium. Non-secreting Cyst.

*Case 39:* F. M.; no surgery.

*Case 40:* A. M. A fairly large non-secreting cyst was found in the left antrum. It ruptured easily, discharging a clear yellow fluid. With the rupture of this large cyst a cystic or polypoid membrane was seen with several smaller thin-walled cysts on the superior, posterior and lateral walls. There was no pus found. All the membrane was removed.

*Microscopic:* One section is interesting. A small non-secreting cyst. In one part there is a submucous areolar tissue extending toward the center of the cyst for some distance, while in an adjacent part there is an abrupt end of this condition, with these submucosal strands being compressed closely beneath the epithelium. Non-secreting Cysts.

*Case 41:* E. M.; no surgery.

*Case 42:* P. M. A large, yellowish, thin-walled cyst was found entirely filling the left antrum. Fifteen cc. of yellow clear fluid were withdrawn from the cyst. A small cyst was also found. Both were typical, non-secreting cysts.

*Microscopic:* No section available. Non-secreting Cysts.

*Case 43:* W. M.; no surgery.

*Case 44:* R. M. The right antrum contained a large thin-walled cyst filled with a light brown serous fluid. It was attached to the floor of the antrum by a rather wide base. It collapsed partially on removal. The remaining membrane was normal in appearance.

*Microscopic:* The specimen consists of a large, intact, thin-walled cyst. A delicate respiratory epithelium covers the outer surface only. The stroma consists of very loose fibrous tissue strands. In places the strands are telescoped together. There are few cellular elements. There is no actual inner limiting membrane in any part of the section. The entire structure is very delicate in appearance. The cyst was "blown up" with formalin after partially collapsing on surgical removal. Non-secreting Cyst.

*Case 45:* D. M.; no surgery.

*Case 46:* R. N.; no surgery.

*Case 47:* L. N. The right antrum contained a large thin-walled, yellow cyst almost filling the entire antrum. The attachment was anterior and superior by a base of about 1 cm. in diameter. On the lateral wall at the center there was a thin-walled, yellow cyst about the size of a pea. When these two structures were removed the remainder of the mucosa was found to be normal. The cysts were removed intact with great care. Non-secreting Cyst.

*Case 48:* M. P. In the right antrum a large, yellow, thin-walled cyst was found attached to the roof. On collapse of the cyst, others were seen. A smaller non-secreting cyst was found on the floor. Also on the floor a small, dense, white cyst was found which was easily removed intact. The remainder of the mucosa was normal.

**Microscopic:** Only one section is available, that of a secreting cyst. The cyst is small. It is covered by respiratory epithelium and has an inner low cuboidal epithelium. There is a moderate submucosa. Non-secreting Cysts and Mucus Cyst.

*Case 49:* G. P.; no surgery.

*Case 50:* R. P.; no surgery.

*Case 51:* S. P.; no surgery.

*Case 52:* E. P. A large, thin-walled cyst lying on the floor and attached by a broad base filled about one-half the right antrum. Clear amber fluid appeared on rupture.

**Remainder of Membrane:** One fairly large mucus cyst, about 1 cm. across, filled with thick mucus, was found on the medial wall. The cyst had a pale wall, fairly thick and was 2 mm. across. Pale membrane, thick, not easily ruptured. Remaining membrane appeared normal.

**Microscopic:** The specimen consists of a very thin-walled membrane. The cellular elements present are closely packed together. The epithelium is of the respiratory type, pseudo-columnar stratified ciliated. The epithelium is not of the delicate type seen in other sections. The stroma consists of several layers of connective tissue closely compressed. There are a few inflammatory cells.

**Microscopic:** The mucus cyst specimen consists of an intact cyst filled with collagenous material. The covering epithelium is found inside and outside as well. The material filling the cyst is deeply staining. There is no inner structure. Non-secreting Cyst with Mucus or Secreting Cyst.

*Case 53:* A. P.; no surgery.

*Case 54:* W. P. A large, thin-walled, yellow cyst almost filled the right antrum. Five cc. of amber fluid were forced from it and coagulated rapidly. The specific gravity was 1.0175. The remainder of the mucosa was normal.

**Microscopic:** The specimen consists of a thin, delicate membrane covered on one side by respiratory epithelium. The stroma consists of loose tissue strands with few cellular elements. Non-secreting Cyst.

*Case 55:* J. R. In the right antrum a thin-walled typical non-secreting cyst was found attached to the lateral wall. The remainder of the mucosa was normal.

*Microscopic:* Section of a non-secreting cyst. There is a thin, delicate cyst wall. This was covered by respiratory epithelium. The submucosa is moderate in thickness and density. Non-secreting Cyst.

*Case 56:* L. R.; no surgery.

*Case 57:* J. R.; no surgery.

*Case 58:* F. S. A left antrum non-secreting cyst was found.

*Microscopic:* A wall of variable thickness is seen covered on one side by respiratory epithelium and having a moderate submucosa.

*Case 59:* F. Sh.; no surgery.

*Case 60:* L. S.; no surgery.

*Case 61:* P. S. A large thin-walled cyst was found filling about one-half of the left antrum. None of the remaining membrane was involved. The cyst was not removed intact as it ruptured.

*Microscopic:* The specimen consists of a thin-walled, delicate membrane covered on one side by respiratory epithelium. The stroma is a delicate areolar tissue infiltrated moderately by round and plasma cells. There is no inner limiting membrane of any sort. There is a little pink staining homogeneous material in the center of the cyst. Non-secreting Cyst.

*Case 62:* W. S. On the right side a large thin-walled cyst was found attached broadly to the anterior face of the antrum. The cyst was a typical non-secreting variety. On the lateral wall and floor a considerable amount of polypoid membrane was found. On the left side a large non-secreting cyst was found, and back of it a smaller thin-walled non-secreting cyst. The remainder of the membrane was normal.

*Microscopic:* There are several sections. One of a thin-walled non-secreting cyst. The covering is respiratory epithelium with a thin but rather closely packed submucosa. There is no inner limiting membrane. There are sections from each antrum, both similar. Bilateral Non-secreting Cysts and Polypoid Membrane.

*Case 63:* H. S. Left side: A large, yellow, typical non-secreting cyst was found. This filled about one-half of the antrum. It was attached by a narrow base to the floor. The remainder of the mucosa was normal.

Right Side: Two rather small cysts of the typical non-secreting variety were found. The remainder of the mucosa was normal.

*Microscopic:* Two sections available. Two different typical non-secreting cysts. The walls are delicate areolar tissue with an outer respiratory epithelium and some suggestion of inner limiting membrane in the form of fibrous tissue. There is a variation in thickness of the walls. Non-secreting Cysts, Bilateral.

*Case 64:* L. S.; no surgery.

*Case 65:* P. S. In the left antrum on the lateral wall superiorly a small, round, polyp-like cyst was found. It was not the typical thin-walled non-



secreting cyst. It did rupture, however, with the liberation of a moderate amount of fluid. The remaining tissue in the antrum was polypoid. This structure was classed as a polyp, though not typical.

**Microscopic:** The specimen consists of a heavy thick-walled structure. There are many cellular elements present. The epithelium is of the respiratory type and covers one side only. There is a considerable inflammatory reaction throughout a connective stroma. There is not the hollow interior of a cyst or the loose, delicate stroma of a true polyp. Category uncertain. Neither a typical polyp nor a non-secreting cyst.

*Case 66:* B. S.; no surgery.

*Case 67:* D. S. A thin-walled cyst filling about one-half of a large left antrum was found. The wall was very thin and ruptured easily with the liberation of orange colored fluid. The remaining mucosa was normal.

**Microscopic:** The specimen consists of a partially intact structure. It is covered by a delicate respiratory epithelium. Beneath the epithelium the stroma is deep and is honeycombed with spaces containing colloid material. There is only slight cellular structure. Another section shows a considerable round cell infiltration and fibrous infiltration as well. Non-secreting Cyst.

*Case 68:* R. S. A thin-walled cyst was found attached to the lateral inferior wall of the left antrum. The slightest trauma ruptured it, with the liberation of a large amount of orange colored fluid. A small mucus cyst was found on the medial wall of the antrum. The remaining membrane was normal.

**Microscopic:** The specimen consists of a thin, delicate membrane. There is a thin respiratory epithelium. In some places it covers both sides of the membrane. As in a previous section showing a similar covering on two sides, this may be due to the sectioning. The specimen is not intact, so that the epithelium cannot be followed the entire way around. Non-secreting Cyst.

*Case 69:* L. St. A large cyst was found filling about half of the right antrum. It was attached to the floor of the antrum by a 1 cm. base. The membrane was very thin and it ruptured easily with the liberation of clear orange colored fluid. The remaining membrane was normal in appearance.

**Microscopic:** The specimen consists of a delicate thin-walled membrane covered on one side by respiratory epithelium. The stroma is a loose areolar tissue with few cellular elements. There is no limiting membrane. Non-secreting Cyst.

*Case 70:* J. S.; no surgery.

*Case 71:* M. St. In the left antrum a large thin-walled, yellow cyst about filling two-thirds of the antrum was found. It was attached to the lateral inferior part of the antrum by a rather wide base. It was not removed intact as it ruptured with the manipulation necessary for removal.

**Microscopic:** The specimen consists of a thin-walled membrane, covered on one side by respiratory epithelium. The stroma consists of a thin connective tissue stroma moderately infiltrated with round cells and plasma cells. There is no inner limiting membrane.

*Case 72:* C. S.; no surgery.

*Case 73:* L. T. A thin-walled cyst was found filling the greater part of the right antrum. It was attached to the medial superior wall. The cyst was filled with thick, gelatinous mucus. This was a very early case and the details are no better than recorded above.

Microscopic: No good section available. Category: Quite certainly a Non-secreting Cyst.

*Case 74:* G. W. In the right antrum a polyp was found attached to the roof laterally. The base was fairly wide. It was not entirely thin-walled but was thick in parts. It ruptured, exuding some straw colored fluid. The polyp filled about one-third of the cavity. The remainder of the mucosa was normal in appearance.

In the left antrum attached to the roof laterally, a polyp was found filling about one-half of the antrum. It resembled a nasal polyp. It did not rupture and was easily removed intact. The remaining membrane was normal.

Microscopic: The specimen consists of a polyp-like structure. It is only partially intact after sectioning. The structure is a delicate areolar one with relatively few cells and large spaces. The structure is covered by respiratory epithelium on one side. This structure contains stroma throughout it and not only just under the epithelium, as in a thin-walled cyst. Polyp, Bilateral.

*Case 75:* J. W. A round thick-walled, white tumor was found on the floor of the right antrum. It lay toward the nasal wall. It was not movable. The tumor measured about 1.25 cm. across and about 1 cm. high. It was filled with thick mucus or pus which was almost too thick to aspirate. The remaining mucosa appeared normal.

Microscopic: No good section available. Mucus or Secreting Cyst.

*Case 76:* J. We. A large thin-walled cyst was found in the right antrum filling about one-half of the cavity. It was removed intact with great care, though the wall was very thin. The base was on the floor. The remainder of the mucosa was normal in appearance.

Microscopic: The specimen consists of a partially intact cyst. The intact specimen disintegrated with sectioning. There is a low respiratory epithelium covering a delicate stroma lightly infiltrated with round cells. The stroma extends some distance into the interior of the cyst, then fades into a rather homogeneous structureless pink staining material. Non-secreting Cyst.

*Case 77:* C. Y. In the left antrum a very large thin-walled non-secreting cyst was found completely filling the antrum. It was attached to the roof of the antrum by a narrow pedicle. The remainder of the membrane was normal.

Microscopic: There is a large non-secreting cyst with a thin but variable wall. This is an outer covering of respiratory epithelium. No inner limiting structure.

*Case 78:* M. Z. Opening of the left antrum found a thin-walled, typical non-secreting cyst of moderate size. The remainder of the membrane was normal. No section available.

As seen by the above tabulation, the most frequent pathological structure found was the non-secreting or mesothelial

cyst. A brief numerical summary of the operated cases is given as follows:

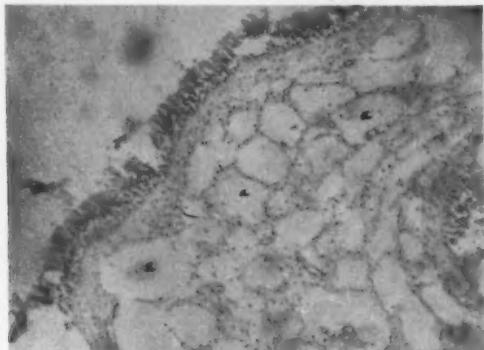
Non-secreting cyst alone with no other membrane changes.....	19 cases
Non-secreting cysts, two or more in the same antrum.....	9 cases
Non-secreting cyst with a mucus cyst or polypoid membrane....	7 cases
Mucus or secreting cyst only.....	3 cases
Polyp .....	6 cases
Polypoid membrane only.....	1 case
No pathology found at surgery.....	1 case
Atypical cysts .....	2 cases

In this series of cases a round shadow seen on X-ray had the great numerical likelihood of being a non-secreting cyst. This did not preclude the possibility of a mucus cyst being found in the same sinus, though this was not a very common finding. In several cases there was more than one non-secreting cyst in the same antrum; this was apparent on X-ray prior to surgery. In most cases after the removal of the cyst or cysts, the remaining antrum membrane appeared normal. In only a few instances was there any free mucopus in the cavity. These structures, then, are perfectly compatible with a clean normal sinus membrane. Some of the antra had been purulent at the start of treatment, but at the time of surgery had been cleaned up and were asymptomatic. Often when a sinusitis existed it was found in the antrum on the opposite side to that containing the cyst. These cysts, then, do not seem to predispose a sinus to infection and if infection does supervene, it will clear as readily as it would in an antrum containing no cyst. This is difficult to make as an absolute statement but it does seem true on the basis of these cases.

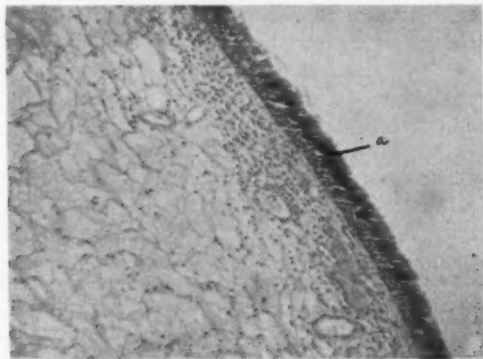
I think it probable that these cysts originated as a result of a sinus infection or nasal allergy, but the absence of any definite history in many cases would lead one to believe that the sinusitis may have been only that incident to an ordinary cold. As has been explained in the literature, cysts do not seem to occur often in chronic, thickened sinus membranes, probably because loose distensible membrane is necessary for their formation. One would think that a secreting or mucus cyst would form in these chronic membranes because of cilia loss and obstruction to the duct outlets, but such does not seem to be the case.

## FORMATION OF CYSTS.

*Non-secreting Cyst:* By the microscopic and gross findings these cysts would seem to be definitely formed by distension of one or more of the areolar spaces in the subepithelial tissue. (see Section 1). The distension is by a fluid which is



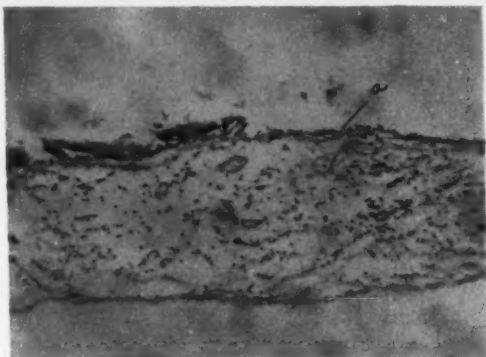
Section 1a. Areolar tissue space which may become distended further to form a cyst. Many of these spaces may coalesce to form one cystic cavity shown to be very similar to a transudate. The cyst has a very thin wall covered on one surface (outer) by the pseudostratified columnar ciliated epithelium of the antrum cavity



Section 2a. Pseudostratified columnar ciliated epithelium of the antrum cavity covering the cyst.

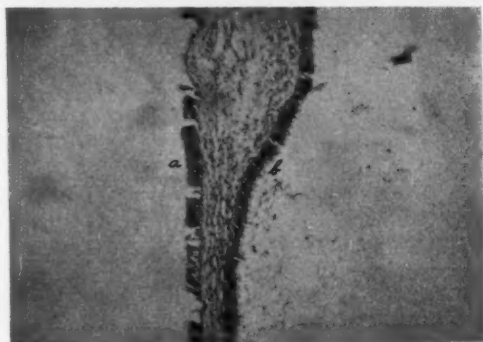
which is taken along by the growing cyst as it enlarges (see Section 2). Often the epithelium is very low columnar or

cuboidal and at times entirely missing, due to the marked distension (see Section 3). In several sections there appeared to be epithelium both on the outer and inner surfaces, but this appearance was only for short distances and was thought to



Section 3a. Area of missing epithelium. The section is the full thickness of a typical non-secreting cyst wall. The structure is loose and delicate. There is no inner epithelium or limiting membrane.

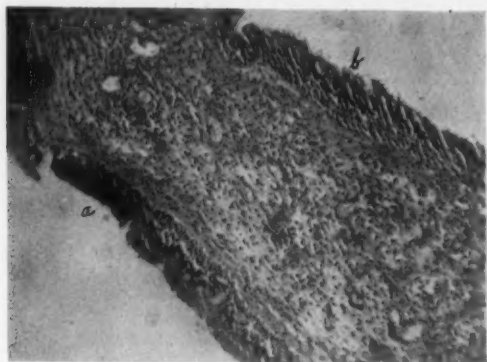
be due to the sectioning (see Sections 4 and 5). The connective tissue spaces may become distended in any part of the



Section 4a, b. Epithelium on the inner and outer sides of a non-secreting cyst wall. The inner epithelium was only present for a short distance and is thought to be due to a crease in the membrane from fixing and sectioning. The non-secreting cyst does not have an inner epithelium.

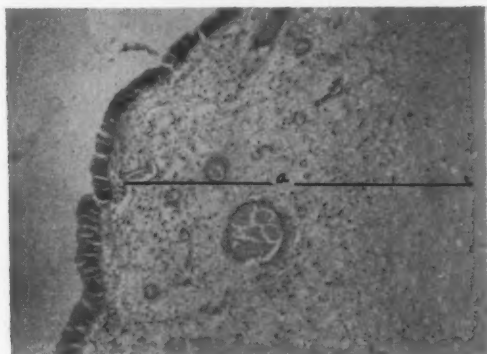
membrane. If the space which becomes the cyst cavity is close to the epithelium, there will be many layers of connective tissue carried upward by the distension of the fluid, and

the wall will show many strands under the epithelium (see Section 6). At times the connective tissue strands are closely



Section 5a, b. Epithelium on the inner and outer sides of a non-secreting cyst wall. This occurred only in limited area of the slide. This non-secreting cyst wall is thicker and heavier than most.

packed together under the epithelium and appear as compressed circular layers (see Section 7). In other cysts the wall is composed of loose areolar structure with no compres-



Section 6a. A considerable amount of subepithelial connective tissue. This non-secreting cyst wall shows more stroma than most of the membranes do.

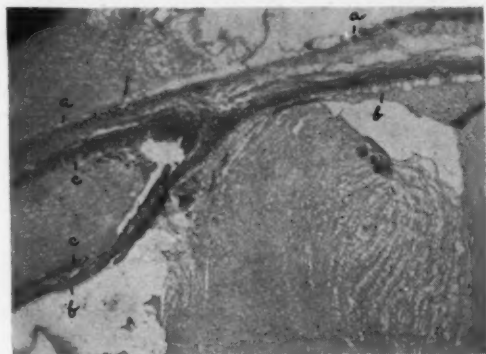
sive effect from the contents of the cyst noticeable. Perhaps the areolar spaces are also edematous and resist compression by being at the same pressure.

The spaces distended must always lie above the glandular position of the sinus membrane, for one does not see any remnants of glandular structure in the cyst wall.



Section 7a. Several layers of fibrous tissue strands running around the cyst wall just under the epithelium. This gives the appearance of a true inner limiting membrane. This section is from a typical non-secreting cyst.

McGregor<sup>2</sup> believes the cyst is started in the loose areolar tissue of the submucosa from infective or vasomotor changes. The tissue spaces become edematous and finally as the dis-

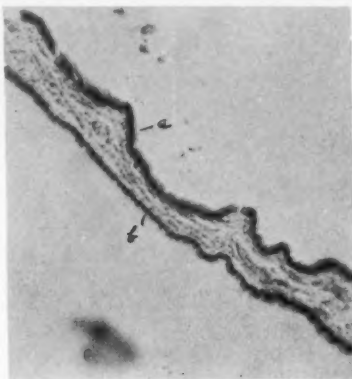


Section 8. Secreting or mucous cyst enclosing another secreting cyst. a. Outer or sinus epithelium covering the whole cyst. b. Inner cyst epithelium which is epithelium of the mucous gland which has become obstructed and distended.

tension increases the fibrous strands elongate and finally rupture with the coalescence into one cavity. He further states



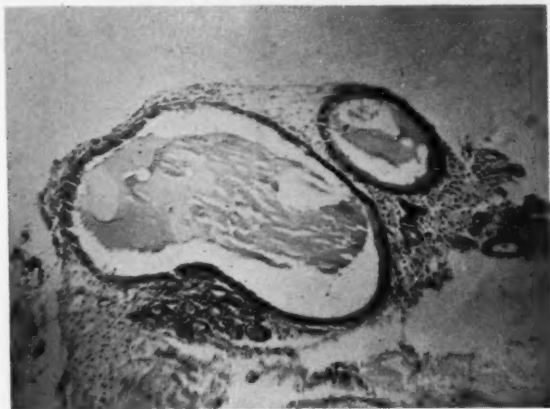
that the fluid which forms the distensive power of the cyst comes from capillaries which have been injured by infection and anaphylactic toxins making them more permeable. Proteins pass into the tissues which raises the osmotic pressure and, therefore, draws in water. Inflammatory cells also break down and raise the osmotic pressure.



Section 9. Secreting or mucous cyst wall. a. Outer or sinus epithelium. b. Inner or glandular epithelium.

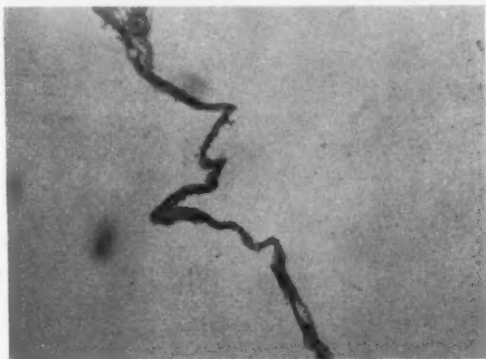
*Secreting or Mucus Cysts:* These cysts are formed by the distension of a mucus gland in the sinus mucosa. In a good specimen this is evidenced by the presence of epithelium on the inside as well as the outside of the cyst. The duct of the gland which becomes distended is lined by a columnar ciliated epithelium which forms the inner epithelium. The sinus epithelium is carried up with the distending duct and gland and so covers the mucus containing cyst on the outside (see Sections 8, 9 and 10). McGregor<sup>2</sup> believes the most important factor responsible for the obstruction of the duct is the loss of the ciliary action during repeated sinus infections where the mucus load to be carried off is great. He believes this ciliary loss is more important than edema, cellular infiltration or increase in connective tissue, which are also often found. The few sections of secreting cysts removed here are shown. Often the wall is very thin and in places is covered by no epithelium (see Section 11). The distension of the cyst may

destroy the epithelium wholly or partially. The growing or enlarging cyst may also press on an adjacent duct, causing a secondary cyst formation which in turn may be flattened out



Section 10. Two distended mucous glands or small mucous cysts. Glandular epithelial lining is seen.

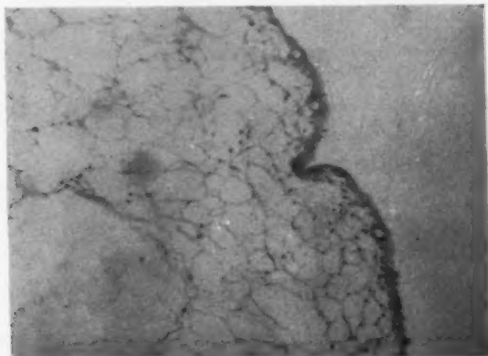
(see Section 8). The mucus cysts seen here were much smaller than the non-secreting cysts.



Section 11. Thin secreting cyst wall. Epithelium here has been lost on each side probably because of distention.

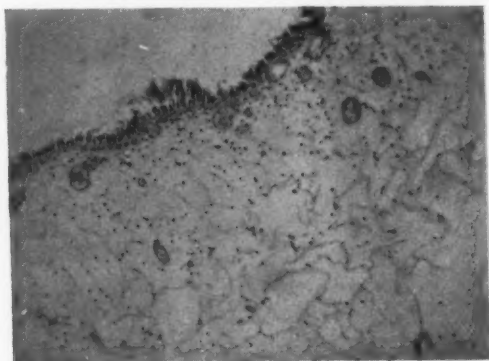
*Antral Polyp:* The polyps found in the antrum in these cases were entirely similar to the nasal polyp (see Sections 12

and 13). Few sections of these structures are available from this series, so that very little more can be said of them. They are, however, composed of multilocular edematous spaces and are not filled with free fluid, such as the cyst.



Section 12. Section through an antral polyp. The stroma is continuous from wall to wall with no free cavity.

*Bacteriology and Biochemical Nature of Non-secreting Cysts:* Those who believe non-secreting cysts to be a cause



Section 13. Section through a nasal polyp from comparison with the antral polyp, Section 11. Their structure is very similar. Loose areolar edematous tissue throughout.

of marked symptoms have been at a loss to explain the mechanism by which they produce these symptoms. The cysts cul-

tured here were bacteriologically negative. In an excellent article by Lindsay,<sup>1</sup> and another by Eichelberger and Lindsay,<sup>2</sup> it was also brought out that the cultures from the cystic fluid taken at operation or by puncture repeatedly showed no growth. The probability of toxins or foreign protein being responsible for the symptoms has been advanced.<sup>1</sup>

In an effort to explain the symptoms, Eichelberger and Lindsay<sup>2</sup> made biochemical analysis of cyst fluid. The amount obtained from a case was from 2 to 10 cc. It was found always to be clear yellow fluid which always clotted. Determinations made of pH total CO<sub>2</sub>, water, proteins, non-proteins, nitrogen, chloride, sodium, potassium, calcium, magnesium and sugar. There was found a distinct similarity between blood serum and cyst fluids. This indicated that many substances passed from the blood to these cysts. The protein content was found much higher than in a transudate and was more like that of an inflammatory exudate. The explanation is that the membrane is altered by inflammation so as to allow free passage of protein until equaling that of blood serum.

No detailed analysis of fluid found here was made. The material obtained from the non-secreting cysts always clotted promptly. The coagulum could be removed, leaving a clear yellow-orange colored fluid. The specific gravity varied from 1.017 to 1.020. An arbitrary line is often drawn at 1.015, transudates being below this and exudates above it. In this arbitrary category the cyst fluid would be classed as an exudate.

*Literature:* Aside from the articles mentioned and referred to in the text, there are very few. Fuller,<sup>3</sup> in an article written in 1932, entitled, "Cysts of the Antrum," reports two cases which he states illustrate each of the varieties of cyst found in this region. The two cases are of dental origin. No consideration is given in this article to the non-secreting or secreting cyst. Hughes<sup>4</sup> wrote an article in 1940, "Cysts of the Maxillary Sinus." He states that the literature is meager and the classification confusing. He speaks only very briefly of the mesothelial cyst and gives one case report, that of a

dental cyst. Lobell,<sup>9</sup> in 1927, discusses the reason for the formation of mucocoeles. His discussion concerns the frontal sinus for the most part. He reports one case of maxillary cyst which by description seems to be that of a non-secreting cyst.

#### SUMMARY.

1. Round shadows seen in the maxillary sinuses on X-ray are discussed. Such a round shadow seen by X-ray may represent a non-secreting cyst, secreting cyst (mucus cyst), or a polyp. A finding by X-ray does not represent a definite pathological entity. The differential diagnosis is discussed.

2. The frequency of these structures cannot be determined accurately. One estimation from over 1,600 X-ray reports on ear, nose and throat clinic patients here gave a frequency of approximately 5 per cent. In one group of 100 low pressure chamber operators (not mentioned in the text), 15 per cent were found to have X-ray evidence of a maxillary cyst or polyp.

3. The symptomatology attributable to antral cysts is discussed. Symptoms such as fullness, pain and numbness may arise locally from pressure. Many other far-reaching symptoms have been attributable to antral cysts. Headache, arthralgia and arthritis, fatigue, etc., have been mentioned. Most of the patients seen here did not present such symptomatology. Frequently a cyst was found in patients complaining of dizziness, hay fever, sinusitis, headache, nervousness, etc., but for the most part no etiological relationship could be established.

4. The treatment as followed here is outlined.

5. Gross and microscopic findings are tabulated.

6. The mechanism of cyst formation is discussed.

7. Seventy-eight cases are presented here. Forty-two cases have been operated. Most of the cyst removals were done to qualify men for aviation. The presence of a cyst was disqualifying.

## BIBLIOGRAPHY.

1. LINDSAY, J. R.: Non-secreting Cysts of the Maxillary Sinus Mucosa. *THE LARYNGOSCOPE*, 52:2:84-100, Feb., 1942.
2. MCGREGOR, C. W.: The Formation of Histologic Structure of Cysts of the Maxillary Sinus. *Arch. Otolaryngol.*, 8:5:505-519, Nov., 1928.
3. HARDY, G.: Benign Cysts of the Antrum. *Ann. Otol., Rhinol. and Laryngol.*, 48:3:649, Sept., 1939.
4. STRAUS, C. D.: Mucosal Cysts of the Maxillary Sinus. *THE LARYNGOSCOPE*, 54:6:267-276, June, 1944.
5. JAMES, J. E.: Mucoid Cyst of the Maxillary Sinus Causing Epilepsy. *Pa. Med. Jour.*, 37:12:1007, Sept., 1934.
6. EICHELBERGER, L., and LINDSAY, J. R.: Chemical Composition of Fluids from Benign Cysts of the Antrum. *Proc. Soc. Exper. Biol. and Med.*, 48:11:191, Oct., 1941.
7. HUGHES, T. E., and DRYDEN, J. S.: Cysts of the Maxillary Sinus. *Va. Med. Mon.*, 67:11:687, Nov., 1940.
8. FULLER, T. E.: Cysts of the Antrum. *Jour. Ark. Med. Soc.*, 29:6:127, Nov., 1932.
9. LOBELL, A.: Relationship Between Mucocoeles and Cysts. *Arch. Otolaryngol.*, 6:6:546, Dec., 1927.

300 Homer Avenue.

---

### J. BISHOP ANNOUNCES FIRST HYPONEEDLE WITH PLASTIC HUB.

The first postwar improvement in hypodermic needles, a needle with the first plastic hub, was announced by Paul C. Kerk, president of J. Bishop and Co., Platinum Works. The hub of the Albalon needle, as the company calls this innovation, is made of gleaming white plastic nylon. The needle itself is of stainless steel and is so beveled as to cleanly pierce and spread the epidermis without undue cutting, slicing or bruising the skin. This also provides a less painful injection.

The plastic hub withstands all commonly used methods of sterilizing, eliminates freezing of hub and syringe tip and thus tends to reduce breakage of syringe from this cause. Leakage around syringe tip is also minimized by the elastic qualities of the Albalon hub. The company has just released the Albalon needle for distribution through the usual trade channels, and will promote the sales of this and the Bishop production in the leading medical and hospital journals.

### ANTI-FOGGING DEVICE—AIR JET.\*†

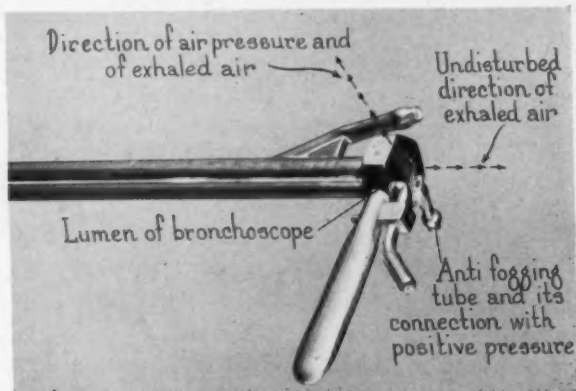
(For Use on Laryngoscopes, Bronchoscopes, Mouth Gags, Etc.)

EDWIN N. BROYLES, M.D.,  
Baltimore, Md.

Any method that aids the surgeon's vision in the examination and treatment of diseases of the lower respiratory tract widens his ability to aid the patient.

For laryngoscopic or bronchoscopic observation, the operator's eye must be held close to the proximal end of the tube and in a direct line with the stream of warm, moist air exhaled or coughed out.

A device is herewith presented that directs the stream of expired air in such a way that it does not contact or fog the lenses of the operator's glasses.



Air jet, antifogging tube for bronchoscope.

A small tube is placed at the proximal end of a laryngoscope, bronchoscope or mouth gag so that air blown through it (5-15 pounds) hits the air stream of exhalation at right angles, diverting it away from its original direction.

Pus or blood being coughed out will be deflected less, but still will be directed away from the area of the operator's central vision.

1100 North Charles Street.

\*From the Department of Otolaryngology, The Johns Hopkins Hospital, Baltimore, Md.

†Manufactured by the Chris Lingelbach Co., Baltimore, Md., and the George F. Pilling Co., Philadelphia, Pa.

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, July 30, 1946.









# Central Institute for the Deaf

## **NATIONAL RESIDENTIAL AND DAY SCHOOL FOR THE DEAF AND DEFECTIVES IN SPEECH**

Approved by Advisory Council of Foremost Ear Specialists and Educators

New fire-proof buildings beautifully located opposite Forest Park. Modern Dormitories and Equipment. Best home environments. Pupils constantly in care of teachers or experienced supervisors.

### **ORAL SCHOOL FOR DEAF CHILDREN**

C. I. D. offers all advantages of exclusively Speech Training and expert medical supervision for both Resident and Day Pupils.

Nursery School (2 years of age) through the Elementary Grades.

### **ACOUSTIC TRAINING FOR CHILDREN WITH RESIDUAL HEARING**

Salvaging of Residual Hearing is a specialty of C. I. D. The Acoustic Method was created here. Group and individual hearing aids used for class instruction at all grade levels.

### **LIP-READING INSTRUCTION**

Private and Class Instruction for Hard-of-Hearing Adults and Children.

Conversational Classes for advanced pupils. Speech conservation stressed.

### **CORRECTION OF SPEECH DEFECTS**

Private and Class Instruction for children with normal hearing and delayed speech or defective speech.

Resident and Day Pupils (2 years of age through Elementary Grades).

Private Instruction for Adults.

Correction of Imperfect Phonation, Imperfect Articulation, Aphasia, Stuttering.

### **TEACHERS TRAINING COLLEGE**

Two years of Training following a professional curriculum for applicants with adequate college qualifications. Graduates qualify for degrees of Bachelor of Science in Education or Master of Science in Education from Washington University. Graduates prepared to teach both the deaf and speech defective.

DR. MAX A. GOLDSTEIN, Founder      Miss JULIA M. CONNERY, Principal Emeritus

For further information address

DR. HELEN SCHICK LANE, Principal

**818 S. KINGSHIGHWAY 10, ST. LOUIS, MO.**

## CONTENTS

RHINOLOGY IN CHILDREN, RESUME OF AND COMMENTS ON THE LITER- ATURE FOR 1945. D. E. S. Wishart, M.D., Toronto, Canada - - -	391
BENJAMIN GUY BABINGTON — INVENTOR OF THE LARYNGOSCOPE. Walter A. Wells, M.D., Washington, D. C. - - - - -	443
ROUND SHADOWS IN THE MAXILLARY SINUSES. R. Wesley Wright, M.D., Palo Alto, Calif. - - - - -	455
ANTIFOGGING DEVICE — AIR JET. (FOR USE ON LARYNGOSCOPES, BRONCHOSCOPES, MOUTH GAGS, ETC.) Edwin N. Broyles, M.D., Baltimore, Md. - - - - -	490

